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AN ANALYSIS OF FACTORS THAT INFLUENCE REENLISTMENT DECISIONS IN THE US ARMY

by

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The purpose of this thesis is to analyze factors that influence first-term reenlistment decisions in the US Army. The data used for this thesis were taken from the US Army Small Tracking File (STF) database and merged with Defense Manpower Data Center (DMDC) US Army enlisted cohort files. The Army currently categorizes personnel into 10 broad characteristic groups based on gender, education, Armed Forces Qualification Test (AFQT) score category, and enlistment term. The scope of this thesis is limited to soldiers in the first characteristic group, commonly known as "C-Group 1." This characteristic group consists of men who enlist for a 3-year or 4-year term of enlistment, score at least at the 50th percentile on the AFQT, and possess at least a high school diploma. This group accounts for approximately one-third of all enlistees. This thesis specifically examined the demographic background and military experience characteristics of soldiers, eligible for reenlistment, from the 1990, 1991, and 1992 cohorts. Descriptive statistics, cross-tabulation analysis and logistic regression were employed to analyze the data. Results suggest key influencers on the reenlistment decision are pay grade, family status, race, length of first-term enlistment, education, and AFQT category. Further research is recommended to analyze additional characteristic groups and cohorts. The reenlistment model could be refined by incorporating economic variables from current Army personnel strength and economic projection studies.

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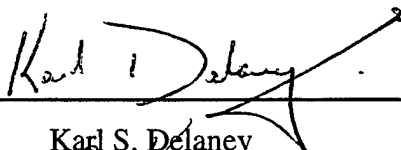Major, Australian Army
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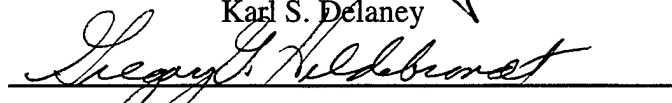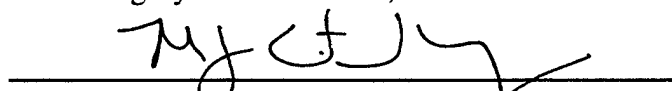## NAVAL POSTGRADUATE SCHOOL
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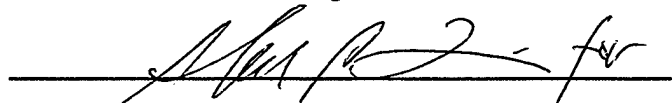
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ABSTRACT

The purpose of this thesis is to analyze factors that influence first-term reenlistment decisions in the US Army. The data used for this thesis were taken from the US Army Small Tracking File (STF) database and merged with Defense Manpower Data Center (DMDC) US Army enlisted cohort files. The Army currently categorizes personnel into 10 broad characteristic groups based on gender, education, Armed Forces Qualification Test (AFQT) score category, and enlistment term. The scope of this thesis is limited to soldiers in the first characteristic group, commonly known as "C-Group 1." This characteristic group consists of men who enlist for a 3-year or 4-year term of enlistment, score at least at the 50th percentile on the AFQT, and possess at least a high school diploma. This group accounts for approximately one-third of all enlistees. This thesis specifically examined the demographic background and military experience characteristics of soldiers, eligible for reenlistment, from the 1990, 1991, and 1992 cohorts. Descriptive statistics, cross-tabulation analysis and logistic regression were employed to analyze the data. Results suggest key influencers on the reenlistment decision are pay grade, family status, race, length of first-term enlistment, education, and AFQT category. Further research is recommended to analyze additional characteristic groups and cohorts. The reenlistment model could be refined by incorporating economic variables from current Army personnel strength and economic projection studies.

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I. INTRODUCTION

A. BACKGROUND

Following the 25th anniversary year of the All-Volunteer Force (AVF), the military drawdown that began in the late 1980s has now found a resting point. The changing nature of conflict and an increasingly healthy economy, with low unemployment rates, provide manpower planners immense challenges to shape the armed forces to best meet operational missions. Sustained strength of the national economy has made career choices more plentiful, which means an unprecedented demand for workers. Recruiting and personnel retention continue to be the two major tools available for manpower planners to formulate force management policy. The military at the turn of the century must face a generation of young people who have little or no connection to military life. It has become increasingly important, then, to examine the factors that contribute to the quality and commitment of personnel who will make up the force of the future.

Turnover among military personnel today, particularly in the first-term, is a matter of considerable concern to many people. To attract and maintain a high-quality force, the military competes directly with civilian sector jobs. In a time of economic prosperity, this competition is now particularly intense. Indeed, maintaining recruiting requirements is a difficult and costly task. The following figures highlight this difficulty. In fiscal year 1998, the Air Force spent $131.9 million to sign up some 31,700 people, or about $4,160 per recruit. The Marines spent $191.7 million for

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34,300, or $5,590 per recruit. The Navy spent $352.1 million to sign up 48,400, or $7,275 per recruit. The Army spent $802.7 million to attract 71,800 recruits, or $11,180 each (Woods, 1998). The Air Force and Marine Corps achieved 100 percent of their numeric recruiting goals. The Army reached 99 percent of its numeric goal, missing its objective by 776 individuals, while the Navy achieved 88 percent of its recruiting objective, resulting in a shortfall of 6,892 recruits (American Forces Press, 1998). Maintaining, and ultimately improving on this effort, will require innovative ideas that will need to be closely linked to personnel retention efforts.

The Services have well-established procedures for analyzing youth propensity to enlist. Since 1975, the Department of Defense (DoD) has conducted annually the Youth Attitude Tracking Study (YATS), a computer-assisted telephone interview of a nationally representative sample of 10,000 young men and women. This survey provides information on the propensity, attitudes, and motivations of young people toward military service. Current YATS results indicate the supply of young men and women with a propensity for military service, relative to accession requirements, is less than before the end of the Cold War. Recruiting high-quality youth into the armed forces will continue to be a challenge. Research has shown that the expressed intentions of young men and women are strong predictors of their enlistment behavior (Cohen, 1998).

In terms of retention, commanders are often confronted with recruit attitudes such as "I plan on staying the minimum time," or "I want to stay in, get money for college, and get out." Soldiers' attitudes are also increasingly influenced by the media. The television coverage of the Gulf War created a phenomenon that became known as

the "CNN war." Kids now watch wars on CNN and see peacekeepers freezing in Bosnia, bidding farewell to families at short notice, and continually maneuvering and being alert in the Persian Gulf. Such hardships and short-notice deployments have always existed in the military. Manpower planners must consider the effects of the media when planing for recruiting and retention in future years.

Retention of high-quality personnel in sufficient numbers to meet Service requirements remains a top priority. No longer can the Services rely on force structure reductions from the post-Cold War drawdown to offset recruiting and retention shortfalls. After years of focusing on drawing down the force, the Services must now refocus on retaining the right number of high-quality people to successfully meet Service missions well into the new millenium. As well as focusing on attitudes, manpower planners must be able to monitor micro-indicators, such as demographic variables and individual factors that capture military experience, to have a thorough understanding of reenlistment at the force level.

B.   SCOPE AND OBJECTIVES

The scope of this thesis is limited to Army personnel who made a reenlistment decision between 1992 and 1996, during their first-term of service. More specifically, the study is restricted to soldiers who enlisted in the US Army between fiscal years (FYs) 1990 and 1992. These personnel are arranged into three groups: those who entered the Army in FY 1990, FY 1991, and FY 1992. Each of these groups is called a "cohort." The study is further refined to men who enlisted for a 3-year or 4-year term of enlistment, scored at least at the 50th percentile on the Armed Forces Qualification Test (AFQT), and

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possessed at least a high school diploma at the time of enlistment. The research identifies relevant variables and trends that influence or pertain to the first-term reenlistment decision for US Army personnel. The data analysis concentrates on soldiers who were eligible to make a reenlistment decision during their first-term of service.

The objective of this research is to analyze "micro-indicators," that is, background demographic and military experience factors that influence active-duty personnel to reenlist in the US Army after their initial, first-term obligation.

C.   RESEARCH QUESTIONS

The primary research questions addressed by this thesis are:

1.   How well is the Army's goal of keeping highly-qualified soldiers beyond the first tour being achieved?

2.   What are the demographic background and military experience characteristics of soldiers who enlisted in FY 1990, FY 1991, and FY 1992?

3.   What is the effect of race, pay grade, family status, enlistment-term, enlistment bonus, education, occupation, age and Army College Fund (ACF) on reenlistment?

4.   What changes and similarities are evident between the FY 1990, FY 1991, and FY 1992 cohorts?

D. ORGANIZATION OF STUDY

The remainder of this thesis is divided into five chapters. Chapter II reviews literature pertinent to reenlistment and personnel retention. Chapter III presents an introduction to the data used in the study and restrictions that were imposed. This chapter also describes the methodology used to analyze the data. Chapter IV presents a preliminary analysis of the data utilizing frequency distributions and cross-tabulations for the three cohorts. Chapter V then specifies the model that was created for this research effort and presents the results of the analyses. Chapter VI follows with conclusions and recommendations based upon the findings of the study.

II. LITERATURE REVIEW

A. BACKGROUND

The purpose of this chapter is to discuss previous studies that have been concerned with predicting personnel retention within the armed services. Within any organization, it is necessary to understand the factors that affect the retention of personnel or employee turnover. Turnover analysis is concerned with determining factors that influence employees to either stay or leave an organization. The retention of skilled enlisted personnel has been a major issue facing military planners since the introduction of the All-Volunteer Force (AVF) in 1973. Cooper (1977) emphasized that the removal of the draft altered the entire philosophy under which the military must manage its human resources. Consequently, numerous studies were conducted in the late 1970s and early 1980s on employee turnover.

Cotton and Tuttle (1986) presented a meta-analysis of the available research, statistically assessing what had been found in these early studies, following the introduction of the AVF. Their paper reviewed over 120 sets of data. Stringent statistical requirements were used in the conclusions concerning the reliability of turnover correlates. Confidence in the variables as a correlate of turnover was rated as weak if the meta-analyses were significant at the .05 to .01 level, weak to moderate if significant at the .01 to .005 level, and moderate if between .005 and .0005. Strong confidence was assumed if the meta-analyses were significant at the .0005 level or below. Pay, overall job satisfaction, age, tenure, gender, education, number of dependents, biographical

information, and met expectations were all found to be strong correlates of turnover. Unemployment rate, job performance, satisfaction with co-workers and promotion opportunities, and role clarity were found to have moderate correlation. Accession rate, task repetitiveness, and intelligence were deemed to have weak to no correlation.

Based on the military's experience prior to the drawdown, over one-third of first-term enlistees fail to complete their term of service, and another one-third do not reenlist after successfully completing their first term. The remaining one-third form the basis of the career force (Ward and Tan, 1985). As the Department of Defense (DoD) reaches the end of its most recent drawdown, it is increasingly important to examine the factors that sustain the quality and commitment of the men and women who will make up the force of the future.

The General Accounting Office (GAO Report, January 1999) has reported that the recruiting and retention of a high-quality work force needs top management attention. The report states that the DoD faces a significant challenge in retaining the hundreds of thousands of new recruits it enlists each year. Enlistees sign contracts ranging from 2 to 6 years; however, most first-term contracts are for 4 years. GAO reported that, despite such a contractual obligation between FY 1982 and 1993, 31.7 percent of all enlistees did not complete their first term of service. Included in this total were 11 percent of enlistees who separated from service during their first 6 months and 20.7 percent who separated between their 7th and 48th month. Retaining well-qualified military personnel is one of the goals in DoD's strategic plan, required under the Government Performance and Results Act of 1993.

Military manpower planners need to appreciate the effects of personnel turnover. Within a military environment, one aspect of turnover analysis is retention and the factors that motivate an individual to remain in an organization. When reenlistment rates are low, more time is spent on accessions, training, and transits for new recruits. Overall, this results in fewer productive person-years per soldier. More recruits mean more training, and more training means more trainers. This tends to reduce productivity, as more experienced soldiers are taken away from their primary mission and are required to train inexperienced personnel. There is a general disruption within the work environment. On the other hand, personnel turnover is not necessarily undesirable. The military requires a young, enthusiastic, and motivated workforce. Turnover can benefit the military with an infusion of new knowledge, smart ideas, and the displacement of inadequate performers. Military manpower planners are therefore faced with achieving the desired balance of the flow of personnel into and out of the force with the optimum amount of labor that can be applied directly to achieving strategic defense missions (Cooper, 1973).

Turnover is generally considered to be both a necessary and unavoidable occurrence within any organization. Turnover can also have a positive effect on employees who elect to stay within an organization. This may be in the form of increased promotion opportunities, enhanced cohesion, and greater job satisfaction. At the same time, individuals may experience adverse effects from turnover within the workplace. This may be caused by increased workloads and changes in communication and social patterns within the workplace. The Army has met its retention goals in recent years, but after ten years of downsizing, the Army now finds itself at a crossroads where further cuts will erode the effectiveness of the force (Gilmore, 1998). With the changing

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nature of conflict and a strong economy, manpower planners need to be aware of what factors determine an individual's intentions to reenlist. By having an understanding of such factors, manpower planners can better implement policies to shape the forces that will best meet operational missions. Pang (1996) stated that, as the drawdown nears its end, military manpower planning attention has shifted from the selective encouragement of departure to a broadly-based focus on retention. He emphasized the military services had done an extraordinary job in maintaining readiness over the course of the drawdown and will need to focus on retaining the skills required for current and future readiness. He highlighted that retention programs, such as reenlistment bonuses, need to be funded at appropriate levels. Prior to offering reenlistment bonuses, it is useful to identify emerging trends within cohorts and organizations. The Army Chief of Staff, General Dennis J. Reimer, testified before the Senate Armed Services Committee in September 1998, that "quality soldiers" are the single, most important factor in achieving both current and future readiness. He further stated that the principal readiness concern must be recruiting, retaining, and taking care of soldiers.

B.   HIGH QUALITY WITHIN THE MILITARY

In a general sense, "quality" refers to aspects and attributes of military personnel that are deemed desirable and that contribute to a more productive, capable, and better-motivated force (Cooper, 1973, p.128). There is no precise definition of quality, however, and it is extremely difficult to agree upon a universal measure of effectiveness. Over the years, quality has come to be interpreted in terms of certain measurable

attributes, such as mental aptitude and education, of new recruits and other members of the force.

People are the foundation of military readiness. Life in the military today is characterized by the use of sophisticated technology and an increased rate of deployment and family separation. These developments demand high-quality, well-trained, and motivated service members. High-quality people are important, and the US military rates well on this measure. Over the past five years, more than 95 percent of all active duty recruits have held a high school diploma, compared with 77 percent of American youth ages 18 to 23. In FY 1998, 94 percent of new recruits were high school graduates, far exceeding the 60 percent level of 1974 (Cohen, 1998). Senior military leaders, such as the Chairman of the Joint Chiefs of Staff, General H. Shelton, readily acknowledge that performance is not achieved by simply having the best equipment. It is achieved in even greater measure by having the best-qualified and trained people to operate that equipment.

The AFQT is recognized by the DoD as a general measure of trainability and a predictor of job performance, when assessing recruit qualifications. AFQT scores, expressed on a percentile scale, reflect an applicant's standing relative to that of the national population of men and women 18 to 23 years of age. The scores are grouped into five categories, based on the percentile score ranges shown in Table 1.

Table 1. Definition of Armed Forces Qualification Test (AFQT) Categories

AFQT Category	Percentile Score Range	Trainability
I	93-99	Above Average
II	65-92	Above Average
IIIA	50-64	Average
IIIB	31-49	Average
IV	10-30	Below Average
V	1-9	Markedly below Average

Source: DoD, Population Representation in the Military Services, 1997.

It should be noted that applicants who score in AFQT Category V are ineligible for military enlistment. Strict limitations are also typically imposed on persons who may be enlisted with scores in AFQT category IV.

The services define high-quality recruits as high school diploma graduates who score in the top 50 percent on the AFQT, that is Categories I through IIIA (OSD, 1997). Horne (1987) conducted a study, that examined AFQT as a predictor of soldier performance. He also related the Army's measure of trainability (AFQT Score) to job or Military Occupational Specialty (MOS) performance. He acknowledged that AFQT scores are not an observation of true trainability, but are nevertheless a good predictor of performance in the Army. He also concluded that AFQT scores are a valid method to allocate manpower to occupational specialties; and that AFQT and rank are significant variables when assessing soldier quality.

In recent years, growth has occurred in the high-quality category of service personnel, despite manpower reductions during the drawdown. When the current reductions began in 1987, there were nearly 2.2 million men and women on active duty. By the end of the drawdown in FY 1999 there will be approximately 1.45 million service members, or about a one-third reduction of the 1987 active-force. The high-quality is demonstrated by the fact that the proportion of active-duty enlisted personnel (AFQT Categories I-IIIA) has increased from 57 percent in 1987, when the drawdown began, to 67 percent in 1997 (Cohen, 1999). From these figures it appears the military has retained much of its high-quality force. However, the 700,000 personnel that left the services also contained many high-quality personnel. As the military drawdown concludes, together with a booming economy, retention of high-quality personnel will become an even more important issue for manpower planners.

C. PREVIOUS RETENTION STUDIES

Numerous studies have been conducted with the aim of evaluating the military's success in retaining personnel. In a review of the literature, Ward and Tan (1985) conducted a detailed study on the 1974 entry cohort file for all services. The study addressed the quality-retention phenomenon problem. The methodology used was to combine performance-based measures with entry-level and background characteristics to construct a single measure of quality. Performance measures used were the length of time for promotion to E-4 and E-5, while the entry-level characteristics employed were education levels and AFQT scores. Quality was estimated for 8 different occupation groups. Results confirmed that background characteristics were useful in predicting

subsequent performance as measured by promotion rates. This work was one of the first to address the important policy question of how the military can attract and retain high-quality recruits.

Cooke and Quester (1992), examined personnel continuation during the first enlistment term and used three separate logistic models to estimate the relationship between recruit background characteristics and successful outcomes in the Navy. The researchers defined a successful enlistee as one who completed his or her enlistment, was eligible to reenlist, and either reenlisted or extended. The study concluded that characteristics associated with contract completion (remain through a full, first term of service) are also good predictors of retention and promotion. Recruits who were high school diploma graduates, with high AFQT scores, and entered through the DEP were considered more likely to be successful. In addition, black and Hispanic recruits were more likely than others to complete their first enlistment and be promoted.

To link the reenlistment decision to the wider economic environment, Warner and Goldberg (1984) used an Annualized Cost of Leaving (ACOL) model to examine the relationship between sea duty and reenlistment. In simple terms, the authors refer to non-pecuniary factors as "taste factors." If the net taste for civilian life exceeds the annual cost of leaving, the individual will not reenlist. The authors concluded that ACOL was significant in explaining much of the variation in a service member's probability of reenlisting. Sea duty and marital status were other significant variables to determine one's reenlistment.

Cymrot (1987) further used the ACOL model to examine the relationship between Selective Reenlistment Bonuses (SRBs) and the retention of Marine Corps enlisted

personnel. The approach assumes that an individual makes a decision in a utility-maximizing framework. It also assumes that an individual ranks military and civilian jobs based on the pecuniary and non-pecuniary aspects of each job. Given a set of alternatives, the individual chooses the job or series of jobs that provide the greatest utility, or provide the most satisfaction over a lifetime. This model incorporates data beyond the first-term, in an econometric analysis. It incorporates explanatory variables such as MOS that were grouped into skill families, unemployment rates, net pay, and pay grade. Net pay was defined as the difference between potential military pay and civilian pay for a one-year period. Cymrot concluded that the effect of net pay on retention was modest at best. He hypothesized that this was due to the problems associated with estimating both military and civilian earnings, and that the variable, rank, captures much of the variation in military pay. Rank had the greatest impact on the retention decision.

The importance of job satisfaction should always be considered. Finn (1988) used responses from a 1985 Department of Defense survey to examine the effects of job satisfaction, satisfaction with the military way of life, and family environment on one's intentions to reenlist in the Marine Corps. He also examined how these factors differed across occupational groupings of "Combat" and "Non-Combat." He concluded that time-in-service, rank, marital status, education, race, job satisfaction, and the chance of finding a good job were all significant variables in predicting reenlistment. Differences also existed across occupational groupings; however, he found that gender was insignificant in predicting reenlistment behavior.

Many studies seem to examine the same problem from a slightly different angle. Finding commonality for determinants of reenlistment is a function of the methodology

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and data being used. Boesel and Johnson (1984), for example, reported mixed results on the effect of marital status and family size on retention. They determined that the increased responsibilities of a family were associated with higher retention rates for all services. Finn (1988) reported just the opposite, stating that marines who were married and had a family would be less likely to reenlist than those who were single. According to Finn, other key variables that were significant in predicting reenlistment included: time-in-service, rank, marital status, education, race, job satisfaction, and the chance of finding a suitable job.

Buddin (1984) found that separation rates were inversely related to individual characteristics that are complementary with firm-specific investment. The report by Buddin relates primarily to early attrition; however, parallels can be drawn concerning skills obtained in the military that are relevant to the civilian sector, when it is time to make a reenlistment decision. In terms of MOS, theory suggests that military personnel who have received more general training and training more suitable to the civilian sector have a lower probability of reenlisting when compared with those trained in combat roles. It is assumed that such training outweighs the effect of the young soldier or marine who decides to enlist for an "action-packed" adventure for four years, and has no desire to reenlist from the beginning of a contract. Kerr (1997) attempted to determine what factors most significantly influenced the reenlistment decision of first-term and second-term Marine Corps personnel. He used a number of different data sets composed from the 1992 Department of Defense Survey and Enlisted Personnel and their Spouses. Surprisingly, no single potential determinant of reenlistment was consistently significant in all four samples evaluated (male and female, which were further divided into first-term

and second-term). The methodology in this study divided MOSs into four distinct occupational groupings. These groupings included combat arms, combat service support, aviation support, and service. The variable, combat, was significant only in the first-term male sample. Delaney (1998) used a similar methodology to analyze MOS and other determinants of first-term reenlistment for the Marine Corps 1991 Cohort, only to conclude that broad MOS categories did not have a significant effect on the first-term reenlistment decision for that particular cohort.

Today, a major recruiting incentive for the US Army is the Army College Fund (ACF). The objective of the ACF is to increase the quality and quantity of Army recruits. Soldiers can now receive up to $50,000 for college education (US Army Recruiting Command Web Site, 1999). Oh (1998) concluded that the two primary reasons for personnel to enlist in the US Army were money for college and for self-development (colloquially stated as "something I can be proud of"). The attraction of college as an incentive to serve in the military is nothing new. College-bound youths have long been attractive to the services, because they are typically easier to train, require less supervision, and are more productive than their non-college-bound counterparts (Gilroy, 1986). Prior to the ACF, other programs had existed to attract college-bound youths into the military, including the Vietnam-Era "GI Bill" and the Post Vietnam Era Veteran's Educational Assistance Program (VEAP). There has, however, been some concern for many years that the benefits to the services of college-bound youths may be offset by their low reenlistment rates at the end of their first term (Gilroy, 1986). In a recent study, Buttrey (1999) used a Classification and Regression Tree (CART) methodology to generate characteristic-groups for use with the Army's new Military Strength

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Management System. Preliminary results using a 1993 data set support the hypothesis by Gilroy and others that personnel who receive a college fund allowance tend to reenlist at a relatively lower rate than do those who receive no college fund.

D.   CONCLUSION

In summary, extensive research has examined military turnover and reenlistment behavior. It is one of the most durable topics in human resource management of the military. It is difficult, if not impossible, to create a perfect model to predict soldier retention. Based on the literature review, however, broad categories of explanatory variables can be established to assist with such predictions. Broad categories include demographic variables, military experience variables, military-civilian comparative variables, and cognitive variables that capture an individual's satisfaction with military life. It is important to have a thorough understanding of these variables to formulate policies to retain a high-quality force.

III. DATA AND METHODOLOGY

A. DATA

1. Data Source

The data used for this thesis were taken from the US Army Small Tracking File (STF) database and merged with Defense Manpower Data Center (DMDC) US Army enlisted cohort files. The STF database is a contractor-maintained database supplied by DCSPER and GRC. All first-term enlistees, from calendar year 1989 through June 30, 1997, were included in the STF database. This database contains one line per enlistee, for this period. Each observation (enlistee record) also includes "trailer records," which are specific events identifying various personal transactions and the month in which the transaction occurred. Trailer records identified non-prior service enlistees, discharge reasons for those not serving, and immediate reenlistment records. Records for the STF database were current through June 30, 1997. It was therefore possible to identify soldiers who reenlisted from the 1992 cohort and earlier, having initially entered the service on a four-year contract or less. A cohort is composed of all personnel who entered the Army in a given fiscal year (FY), October through September.

The STF database contains the following demographic variables: AFQT score, race, gender, term of service, civilian education code, and age-in-months at enlistment. It was therefore necessary to merge this database with DMDC cohort files to capture the effect of other explanatory variables as identified in the literature review. The following additional variables were added to the STF database: occupation code, pay grade at time

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of reenlistment, marital status, number of dependents, more reliable AFQT scores, ACF recipient data, and enlistment bonus recipient data. Upon merging files, the most recent and complete data available were for FY 1990, FY 1991 and FY 1992.

2.   Restrictions Imposed

The Army currently categorizes personnel into 10 broad characteristic groups based on gender, education, AFQT score category, and enlistment term. The scope of this thesis is limited to soldiers in the first characteristic group, commonly known as "C-Group 1." This characteristic group consists of men who enlist for a 3-year or 4-year term of enlistment, score at least at the 50th percentile on the AFQT, and possess at least a high school diploma. This group accounts for approximately one-third of all enlistees (refer to Table 2). The analysis of women in the Service involves additional factors that are beyond the scope of this thesis. As previously stated, restricting the analysis to C-Group 1 limits the study to men only. A better analysis of high-quality soldiers can be achieved by eliminating from the data set, those who score below the 50th percentile or do not possess a high school diploma. Previous studies have concluded that lower scores on the AFQT and failure to complete high school are important variables in predicting a new recruit's likelihood of leaving the Army prematurely (Buddin, 1984).

It is important to remember the purpose of this study is to examine reenlistment behavior, and not focus on the factors that cause first-term attrition. First-term attrition can be succinctly defined as leaving the Army prior to the expiration of an initial term of service. First-term enlisted attrition has remained at 29 to 39 percent of all new recruits in entry cohorts since 1974. For enlistees who entered the services in FY 1992, first-term attrition was 33.2 percent. The Army's attrition was the highest of all the services, at 35.9

percent (GAO report, 1997). First-term attrition may be due to a variety of reasons. The STF does not include detailed reasons for early attrition, but does include the following categories:

a.   illegal absentees and those dropped from the rolls,

b.   expeditious discharges,

c.   early releases for unspecified reasons,

d.   discharges due to misconduct or hardship,

e.   discharges due to physical disability,

f.   discharges early as part of the trainee discharge program, and

g.   those soldiers generally deemed unfit for duty.

By analyzing the STF, soldiers who were ineligible to make a reenlistment decision were deleted from the data set. Such restrictions assisted to remove the bias associated with reenlistment decision, if attrition figures were included.

Table 2 summarizes the observations that were used for analysis in this thesis. Cohort totals are lower for each successive year due to the drawdown. Each cohort is divided into three levels: personnel categorized as C-Group 1, soldiers who were eligible to reenlist within C-Group 1, and the actual number of reenlistments within C-Group 1 for each cohort. Percentages are provided for descending levels. Further analysis within this thesis is focussed on levels one and two.

Table 2. Broad Thesis Cohort Summary Figures

	FY COHORT		
	1990	**1991**	**1992**
Cohort Total	89,508	78,664	77,253
C-Group 1 **(Level 3)**	25,830 (28.8% of cohort total)	23,617 (30.0% of cohort total)	27,771 (35.9% of cohort total)
Eligible to Reenlist **Within C-Group 1** **(Level 2)**	13,619 (52.7% of C-Group 1)	11,810 (50.0% of C-Group 1)	14,436 (51.9% of C-Group 1)
Reenlistments **Within C-Group 1** **(Level 1)**	5,639 (41.4% of eligible)	5,248 (44.4% of eligible)	6,556 (45.4% of eligible)

Source: Derived from merging the STF database and DMDC cohort files.

Table 2 indicates that the percentage of C-Group 1 personnel out of the total number of soldiers who were enlisted each year steadily increased from 28.8 percent in 1990 to 35.9 percent in 1992. This proportion is one measure that indicates the number of high-quality personnel within the Army is increasing. From within C-Group 1 personnel, the number of soldiers who were eligible to reenlist (and had not attrited before their initial contract) remained slightly above 50 percent for each cohort. The percentage of soldiers who reenlisted, from those eligible, increased slightly from 41.4 percent in 1990 to 45.4 percent in 1992.

B. METHODOLOGY

This thesis uses descriptive statistics, cross-tabulation analysis and logistic regression (logit) to analyze the data. The Statistical Product and Service Solutions (SPSS) software, formerly known as the Statistical Package for the Social Sciences, was the specific tool used to conduct the analysis. Frequency distributions were initially generated to provide some insight into characteristics of each cohort. Such simple statistics are also useful to validate the merged data sets, which contain a great deal of information once initial variables are re-coded. It should be recognized, however, that accurate conclusions cannot be drawn from these descriptive statistics. Individual variables in the preliminary analysis are not isolated from the effects of other explanatory variables. The next step to gaining a better understanding of the data is to conduct cross-tabulation analysis.

1. Cross-Tabulation Analysis

Cross-tabulation analysis was performed between likely explanatory variables and reenlistment rates for each cohort. The purpose of conducting cross-tabulation analysis was to indicate to what degree the values were coincident with reenlistment rates. This provides useful information for further model construction. Such information also allows for a validity check and comparison of logistic model probabilities. Cross-tabulations are summarized and presented in easy-to-read charts. However, since a particular cross-tabulation does not control for the effect of other variables, results from cross-tabulation analysis may be misleading. A logistic regression model was then constructed to cover the limitations of cross-tabulation analysis.

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2. Logistic Regression

Logistic regression is designed to use a mix of explanatory variables to predict the outcome of a dependent variable, in this case, the likelihood of reenlisting at the completion of the first term. This logit model offers the ability to calculate changes in the likelihood of reenlistment when one independent variable is changed and all others are held constant. Predicting the likelihood of reenlistment is well-suited for the employment of logistic regression. The dependent variable describes a binary event. The manner in which the data were restricted meant the individual chose to reenlist beyond his initial 3-year of 4-year term of service or resign at the expiration of his first term of service. The logit model is based upon the cumulative distribution function of a random variable, which is suited to situations in which the independent variable is dichotomous (has the value of 0 or 1). The decision to leave the service (discussed in more detail in Chapter 5) is a dichotomous variable that assumes a value of zero if the person did not reenlist and a value of one, if the person reenlisted. The logit model relates the reenlistment decision of an individual to a vector of characteristics for that individual.

As outlined in the SPSS Regression Training Manual (1998), the logistic model is best explained starting with the case of a single independent variable. The logistic regression model can then be written as:

$$\text{Prob (event)} = \frac{e^{\beta_0 + \beta_1 X}}{1 + e^{\beta_0 + \beta_1 X}},$$

or equivalently,

$$\text{Prob (event)} = 1 / (1 + e^{-(\beta_0 + \beta_1 X)}),$$

where β_0 and β_1 are coefficients estimated from the data, X is the independent variable, and e is the base of the natural logarithm. For more than one independent variable the model can be written as:

$$\text{Prob (event)} = e^Z / (1 + e^Z),$$

or equivalently,

$$\text{Prob (event)} = 1 / (1 + e^{-Z}),$$

where Z is the linear combination $Z = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_P X_P$.

The probability of the event not occurring is estimated as

$$\text{Prob (no event)} = 1 - \text{Prob (event)}.$$

The logistic coefficients, contained in the output from the model, can be difficult to interpret, but can be considered in this case, as the log odds of reenlistment. These log odds were converted into partial effect probabilities using the above procedure by use of a spreadsheet model.

The next chapter provides a descriptive analysis of each cohort. Chapter V outlines in detail the specification of the model, provides a description of explanatory variables, and interprets results.

IV. PRELIMINARY ANALYSIS

A. OBJECTIVE

The aim of this chapter is to present the results of preliminary data analysis on the merged STF and DMDC FY1990, FY1991, and FY1992 cohort files. The overall objective of this preliminary analysis is to gain a thorough understanding of the STF database, in order to build an effective regression model for further analysis. As discussed in the previous chapter, analysis is conducted on C-Group 1 personnel who were eligible to make a reenlistment decision. The analysis does not include personnel who attrited early, that is, prior to completing their first-term of obligated service (refer to Table 2, page 22).

In examining the frequency of variable values for each field, the total number of responses for a given variable is divided by the total number of records in the STF, which yields a percentage for all members who were eligible to reenlist within C-Group 1. This yield is the percentage of soldiers who are described by the given variable. Results highlighting general similarities and differences for all three cohorts are graphically depicted in the figures below. The reader should refer to Appendix A for a more detailed, descriptive analysis of individual cohorts.

B. COHORT DATA

1. Frequency

Figure 1 illustrates the racial make-up by cohort. Whites account for the majority (approximately 80 percent) of soldiers within C-Group 1.

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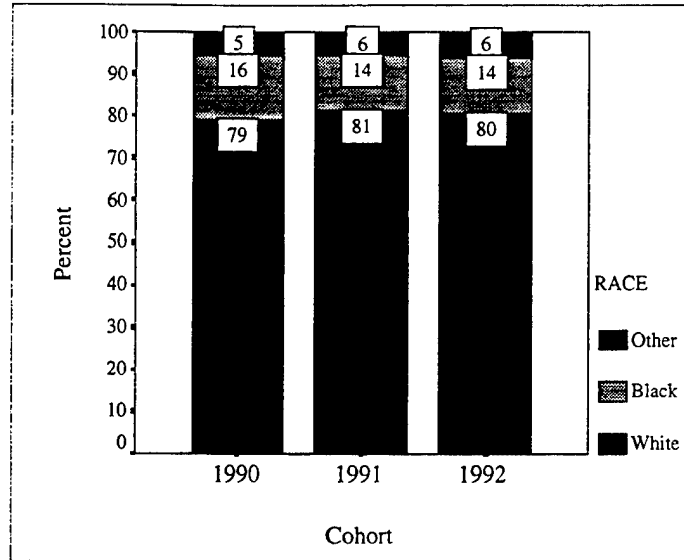
Figure 1. Cohort Frequency by Race

Figure 2 indicates that the majority of soldiers achieved the pay grade of E-4 at the completion of their first term of enlistment
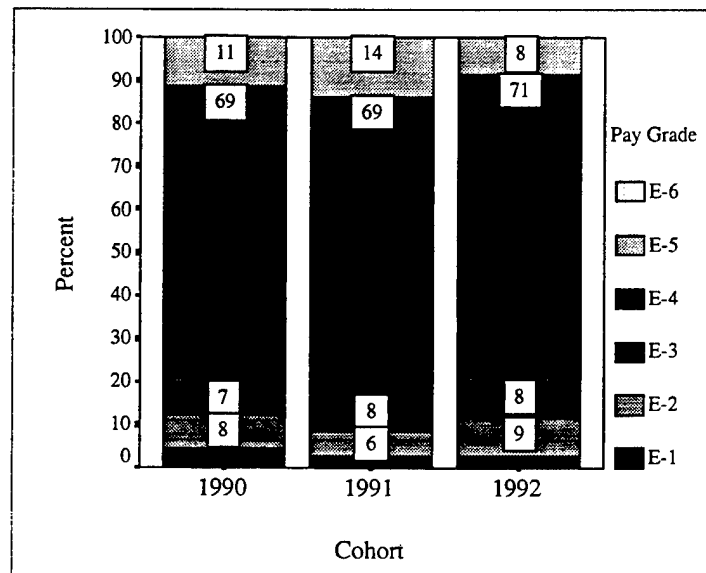
Figure 2. Cohort Frequency by Pay Grade

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Figure 3 shows the majority of soldiers remained single and had no children (SNC) during their first term of enlistment. The 1992 cohort had proportionately more soldiers who were married with children (MWC) than were married without children (MNC) compared with the previous two cohorts. The smallest band indicates that less than 3 percent of soldiers were single with children (SWC) for each cohort.
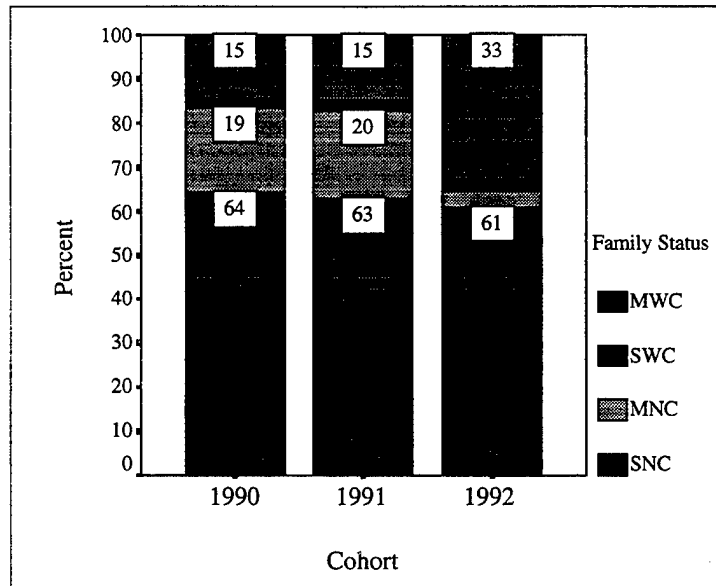
Figure 3. Cohort Frequency by Family Status

Figure 4 shows the majority of soldiers were in Category II and only 7 percent were in Category I for each cohort. Recall that this analysis is an examination of C-Group 1 personnel only, and, by definition, includes only soldiers in the top three AFQT categories.
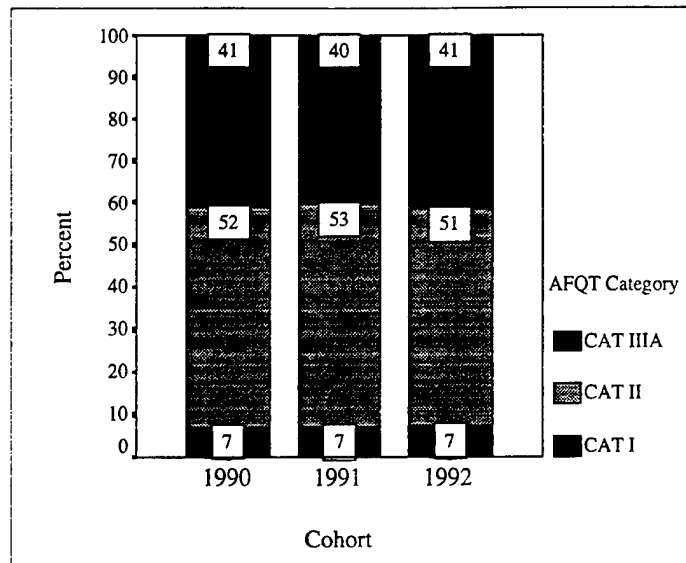
Figure 4. Cohort Frequency by AFQT Category

Figure 5 indicates that approximately two-thirds of soldiers within C-Group 1, enlisted for a four-year term. The 1992 cohort had proportionately fewer four-year-term enlisted soldiers, compared with the two previous cohorts.
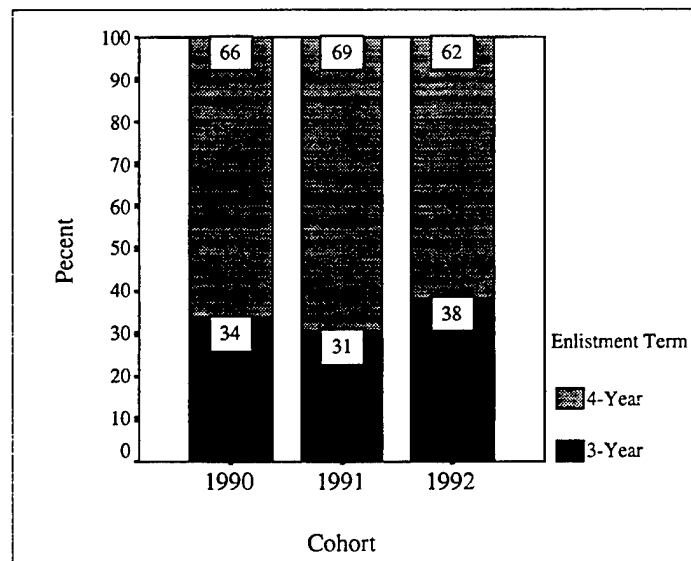
Figure 5. Cohort Frequency by Enlistment Term

Figure 6 shows that there was a declining trend for soldiers who received an enlistment bonus from FY 1990 to FY 1992.
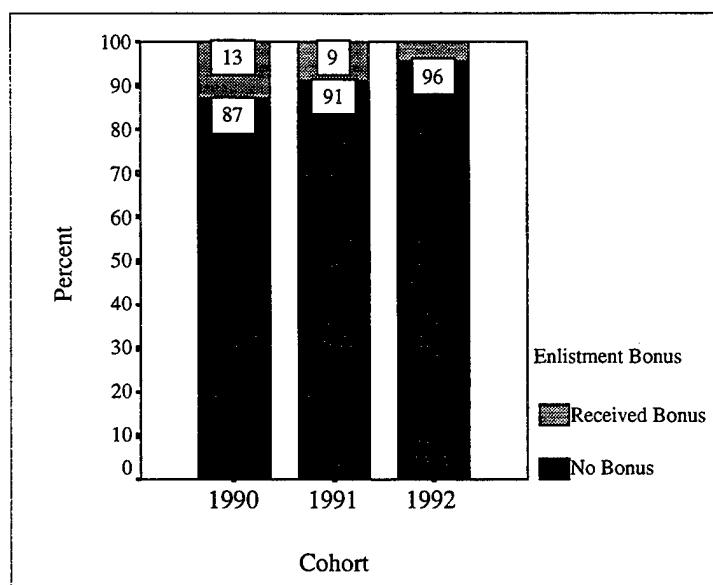
Figure 6. Cohort Frequency by Enlistment Bonus

Figure 7 shows a slight increase (4 percentage points) in the proportion of soldiers who had received some college education prior to enlisting. Recall, soldiers who did not possess a high school diploma at the time of enlistment were not included in this study.
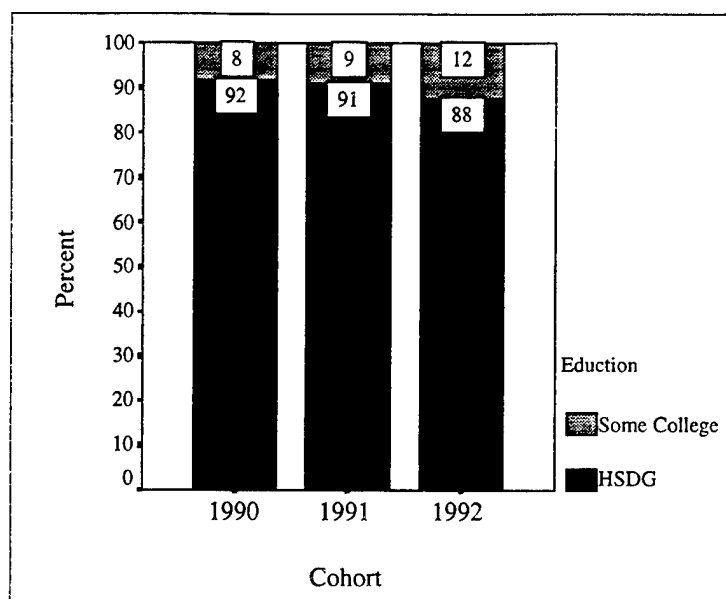
Figure 7. Cohort Frequency by Education

Figure 8 indicates that the majority of soldiers were employed in non-technical military occupations across all cohorts. Soldiers were deemed to be employed in "technical" occupations if their primary job was in one of the following categories: Electronic Equipment Repairer, Communications and Intelligence Specialist, or other Technical and Allied Specialist. If soldiers were not employed in one of these general categories they were deemed to be in a "non-technical" occupation. These broad job categories are defined in the 1997 Department of Defense Occupation Conversion Manual, and are further described in Chapter V of this thesis. In the FY 1992 cohort, there was a slight decrease (5 percentage points) in the proportion of soldiers employed in technical occupations, compared with the two previous cohorts.
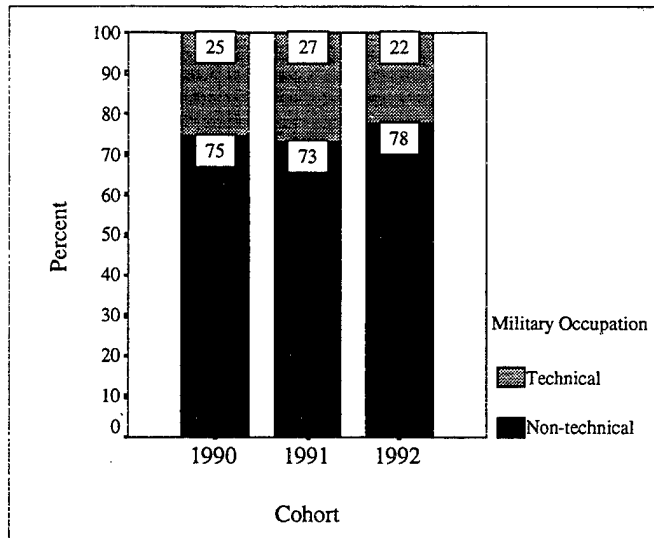
Figure 8. Cohort Frequency by Military Occupation

Figure 9 indicates that approximately three-quarters of enlistments were for recruits under 20 years of age. The mean age at enlistment was 20.01 years, and the median was 19 years. The average enlistment age was slightly older in FY 1992, and the reader should refer to Appendix A for further details.
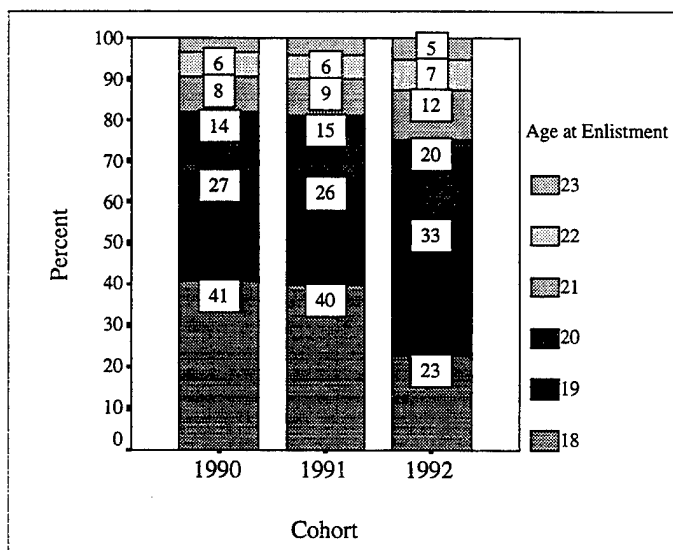
Figure 9. Cohort Frequency by Entry Age

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Figure 10 shows that fewer soldiers received the ACF in FY 1990, compared with more recent cohorts.
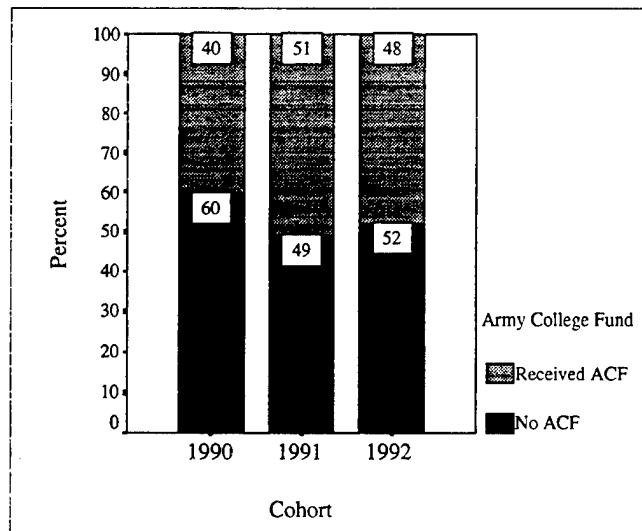
Figure 10. Cohort Frequency by Army College Fund (ACF)

Finally, Figure 11 indicates there was a steadily increasing trend of reenlistment for soldiers in C-Group 1 who completed their first term of enlistment.
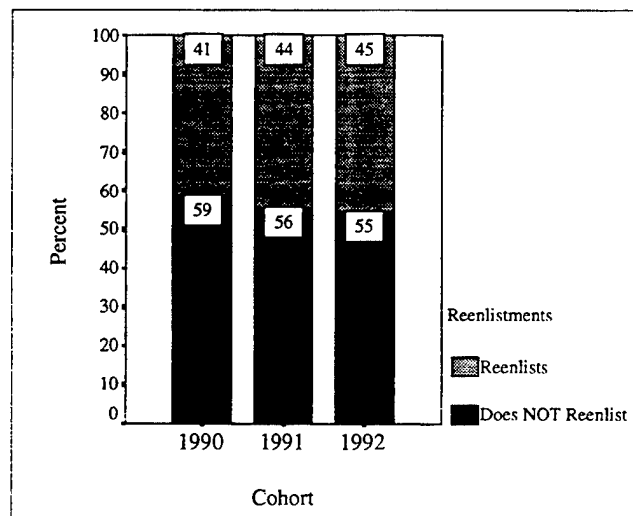
Figure 11. Cohort Frequency by Reenlistment

2. Graphical Cross-Tabulation

Cross-tabulating the data from the STF cohort file helps to reveal the kinds of variables that are likely predictors of reenlistment behavior. Such variables are then included in the logistic regression model, in order to isolate other variables. Results are graphically depicted below for all three cohorts (FY 1990, FY 1991, and FY 1992). Recall that only soldiers who were eligible to reenlist are included in the analysis. The reader should refer to Appendix A for a more detailed, descriptive analysis of individual cohorts.

Figure 12 illustrates C-Group 1 reenlistment rates by race. Black soldiers tended to reenlist at a greater rate than did their white counterparts. The majority (57 percent) of black soldiers reenlisted, while only 41 percent of white soldiers did the same.
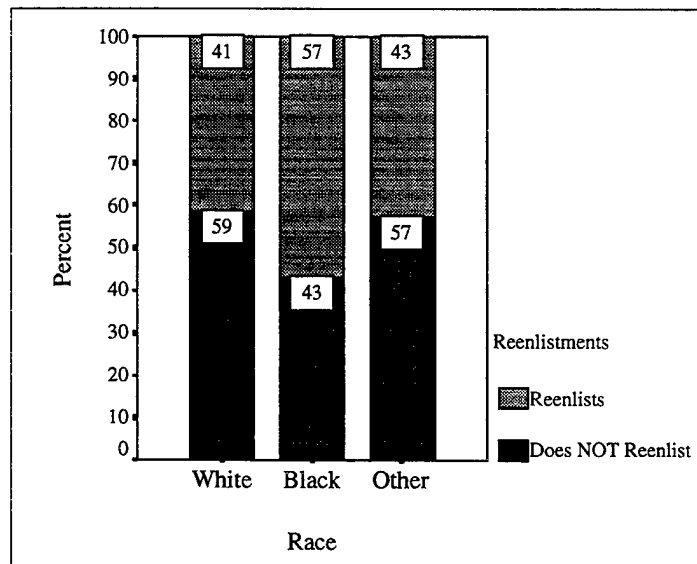
Figure 12. Reenlistment Rate by Race

Figure 13 illustrates C-Group 1 reenlistment rates by pay grade. The vast majority of soldiers who did not get promoted beyond E-3, and were eligible to reenlist, did not reenlist. The higher a soldier's pay grade, the greater was his reenlistment rate.
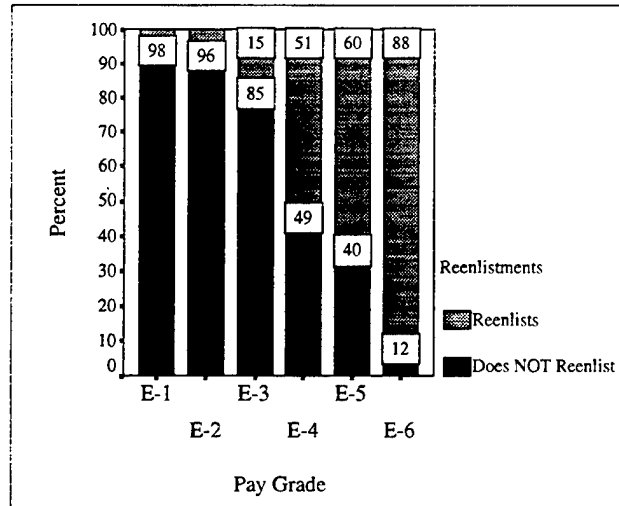
Figure 13. Reenlistment Rate by Pay Grade

Figure 14 presents the C-Group 1 rate of reenlistment by AFQT Category. As a soldier's AFQT score (indicated by category) decreased, his reenlistment rate increased.
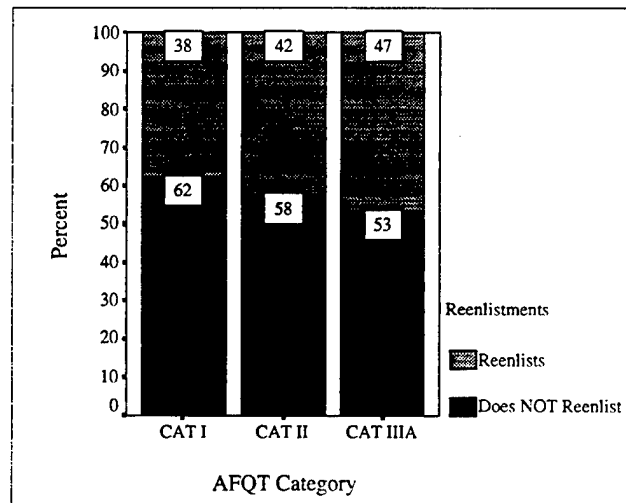
Figure 14. Reenlistment Rate by AFQT Category

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Figure 15 illustrates the C-Group 1 rate of reenlistment by family status. Married soldiers displayed a higher rate of reenlistment when compared with their single counterparts. In general, soldiers with dependents reenlisted at a higher rate than did single soldiers.
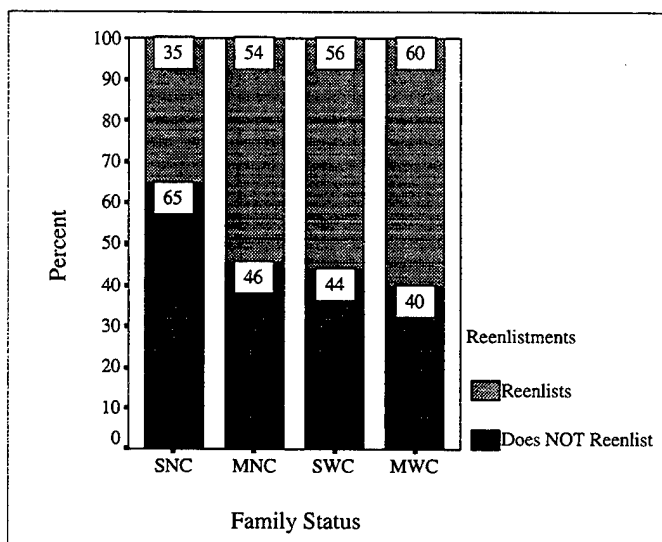
Figure 15. Reenlistment Rate by Family Status

Figure 16 illustrates the C-Group 1 rate of reenlistment by military occupation. Reenlistment appeared to be slightly greater (2 percentage points) for soldiers deemed to be employed in a technical occupation, compared with those in a non-technical occupation.
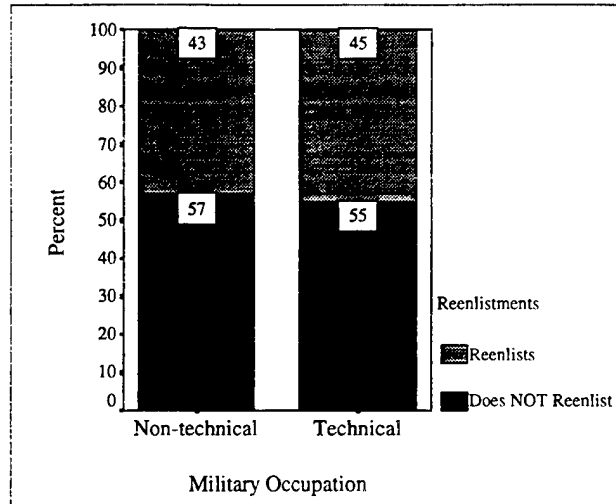
Figure 16. Cohort Reenlistment Rate by Occupation

Figure 17 depicts reenlistment rates by entry age. Only enlistments between the ages of 18 and 23, inclusive, are displayed (this accounts for 86 percent of all three cohorts). Generally, the observed trend is that older soldiers tended to reenlist at a slightly higher rate than did their younger counterparts. This is particularly evident when comparing teenagers at the initial enlistment point to soldiers who were 20 and over.
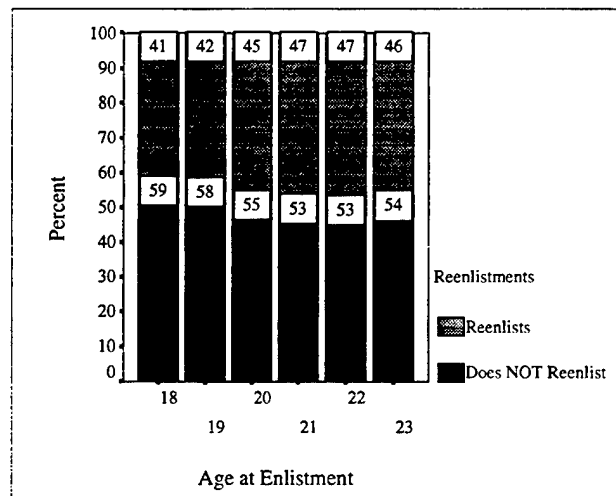
Figure 17. Cohort Reenlistment Rate by Entry Age

Figure 18 shows that C-Group 1 soldiers who received an enlistment bonus tended to reenlist at a slightly greater rate (2 percentage points) than did those without a bonus.
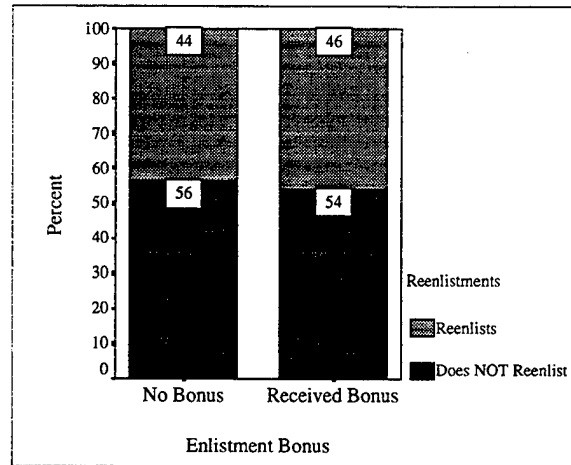
Figure 18. Reenlistment Rate by Enlistment Bonus

Figure 19 indicates that C-Group 1 soldiers who completed an initial 4-year term of service, reenlisted at a higher rate than did those who only completed an initial 3-year term of service.
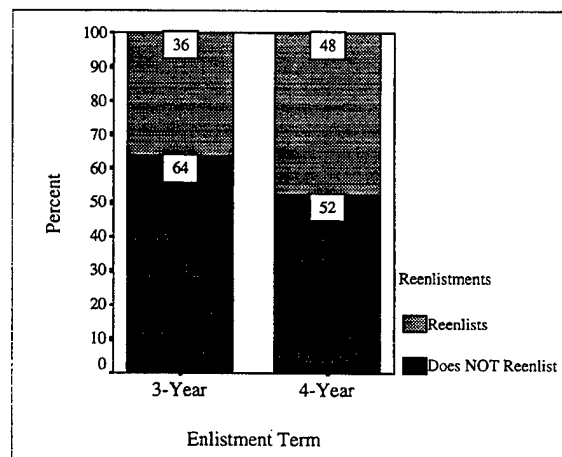
Figure 19. Reenlistment Rate by Enlistment Term

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Figure 20 indicates that C-Group 1 soldiers who had some college education reenlisted at a slightly lower rate (2 percentage points) when compared with those who possessed a high school diploma.
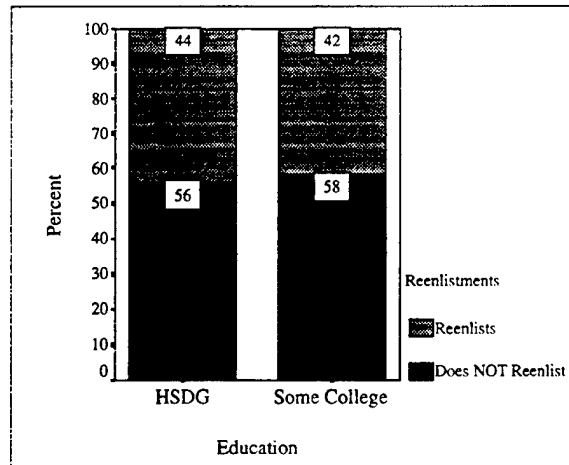
Figure 20. Reenlistment Rate by Education

Figure 21 suggests that the Army College Fund may provide an incentive for C-Group 1 soldiers to leave the Army after the first term. As seen here, the reenlistment rate for soldiers who received the ACF was 9 percentage points lower when compared with those who had no ACF assistance.
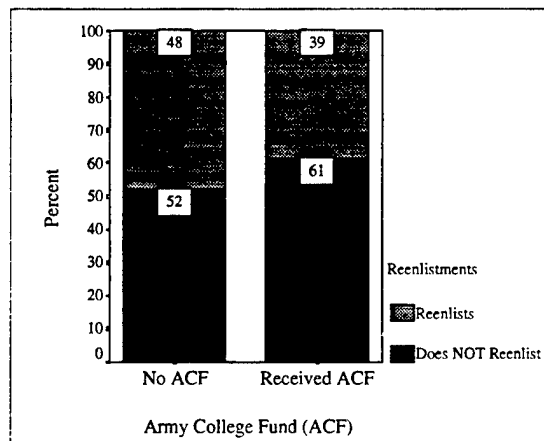
Figure 21. Reenlistment Rate by Army College Fund

C. PRELIMINARY COHORT COMPARISONS

Preliminary exploratory analysis of the data provides a broad overview of the similarities and differences in characteristics across cohorts. A summary of key findings is presented in Table 3 for C-Group 1 soldiers eligible to reenlist.

Table 3. Summary of Key Findings from Frequency Charts

Variable	Major Similarities and Differences Across Cohorts
Race	Similar proportions exist. The majority of soldiers were white.
Pay grade	Similar proportions exist. The majority of soldiers achieved E-4.
AFQT Category	Similar proportions exist. The majority of soldiers were Cat II.
Family Status	FY 1992 had proportionately fewer single soldiers, fewer soldiers married without children, and more soldiers married with children.
Age at Enlistment	FY 1992 average age was slightly older than two previous cohorts.
Education	There was an increase in the percentage of soldiers who previously attended college for FY 1992.
Enlistment Term	Approximately two-thirds of soldiers, within C-Group 1, enlisted for a four-year term.
Enlistment Bonus	There was a declining trend from FY 1990 to FY 1992 for soldiers who received an enlistment bonus.
ACF	Fewer soldiers received the ACF in FY 1990 compared with more recent cohorts
Occupation	There was a decrease in the proportion of soldiers employed in technical jobs in FY 1992 compared with earlier cohorts.
Reenlistment	There was a steadily increasing trend for the total proportion of soldiers who reenlisted from 1990 to 1992.

Source: Derived from merging the STF database and DMDC cohort files and analyzing using SPSS, author.

A summary of key findings relating to reenlistment is presented in Table 4 for C-Group 1 personnel across the FY 1990, FY 1991, and FY 1992 cohorts.

Table 4. Summary of Key Findings from Cross-Tabulations

Variable	Major Reenlistment Trends and Conclusions
Race	Black soldiers reenlisted at increasingly higher rates compared with their white counterparts. Refer to Table 5 for further explanation.
Pay Grade	As pay grade increased, so did reenlistment rates. Virtually the same proportions for each pay grade reenlisted across cohorts.
AFQT Category	As AFQT category decreased, reenlistment rates increased. Proportions for each category were similar across cohorts.
Family Status	Soldiers with dependents reenlisted at higher rates than did single soldiers. Proportions for each category were similar across cohorts.
Age at Enlistment	Teenagers at the time of enlistment reenlisted at noticeably lower rates across all cohorts.
Education	Soldiers with some college education reenlisted at noticeably lower rates for the FY 1991 and the FY 1992 cohorts than for the FY 1990 cohort.
Enlistment Term	The reenlistment rate was greater for 3-year-term enlistees in the FY 1992 cohort, while 4-year-term enlistees appeared more likely to reenlist in the FY 1990 and the FY 1991 cohorts.
Enlistment Bonus	Soldiers who received an enlistment bonus were more likely to reenlist, across all cohorts.
ACF	Soldiers with the ACF reenlisted at lower rates across all cohorts.
Occupation	Steady increases were displayed for those who reenlisted in both technical and non-technical jobs over time.

Source: Derived from merging the STF database and DMDC cohort files and analyzing using SPSS, author.

Another interesting observation to emerge from the C-Group 1 database is the widening gap between the reenlistment behavior of white soldiers and black soldiers, as depicted in Table 5. In cohort 1990, 39 percent of white soldiers reenlisted, compared with 53 percent of black soldiers. In cohort 1992, the overall percentages for both races had increased; however, reenlistment for black soldiers had increased at a greater rate. The 1992 cohort indicates that 43 percent of white soldiers reenlisted, compared with 61 percent of black soldiers.

Table 5. Reenlistment Rates (in Percent) for C-Group 1 Soldiers

by Race and Cohort

RACE	COHORT		
	FY 1990	**FY 1991**	**FY 1992**
White	39	42	43
Black	53	57	61
Other Minorities	38	42	48

Source: Derived from merging the STF database and DMDC cohort files.

At the same time, Table 5 shows a steady increase in the reenlistment rates of other minority races. For the FY 1992 cohort, the reenlistment rate of other minority races (48 percent) had surpassed the reenlistment rate of white soldiers (43 percent).

As shown, cross-tabulations are useful for conducting preliminary analysis and understanding the STF data-set. It is difficult to draw any specific conclusions, however, regarding the likelihood of reenlistment since so many of the variables analyzed affect the

soldier's decision to reenlist. Variables of both a demographic nature and those that describe military experience can influence one's decision to reenlist to differing degrees. Logistic regression is used to isolate such variables and to draw stronger conclusions concerning estimated impact of these variables on reenlistment.

V. MODEL SPECIFICATION AND RESULTS

A. MODEL SPECIFICATION

For the purpose of this thesis, the decision to remain on active-duty service beyond an obligated service requirement can be considered a binary choice and can be evaluated as a dichotomous variable. Once the logistic model has been estimated, the coefficients can be interpreted as the change in log odds (impact on reenlistment) with a one-unit change in a particular explanatory variable, holding all other dependent variables constant. Further, partial effects of explanatory variables can be interpreted as the change in the likelihood of reenlistment when evaluated against a base case. When using a logistic model to predict reenlistments, it is necessary to establish an arbitrary base case, or reference category. For this model, the most common occurring characteristics identified in the preliminary analysis, from C-Group 1 soldiers, were used to establish a base case.

1. Dependant Variable

a. Reenlist This was the dependent variable, used in logistic regression, for this thesis. It indicated whether a soldier was an immediate reenlistment, or not, at the expiration of his term of service (ETS). It was constructed from the STF database, and in particular by analyzing the second event trailer records (recall that the first event was an individual with no prior service). Reenlist is a binary dummy variable, coded with a value of one for soldiers who reenlisted within the required time frame. For accurate modeling purposes, this period is deemed to be no more than 12 months prior to ETS and no more than 3 months after ETS. A concurrent time-series reenlistment study at the Naval

Postgraduate School, using the same STF data, indicates that this is an appropriate and accurate window to use (Hildebrandt and Sze, 1998). The variable is coded as zero for those who did not reenlist.

2. Explanatory Variables

All but one of the explanatory variables (i.e., age) in the reenlistment model are dummy variables. The following description of these variables is provided.

a. Race This variable seeks to identify the effect of race on the reenlistment decision. This variable was divided into the three categories as specified in the DMDC cohort files (WHITE, BLACK and OTHER). WHITE will be the base case or reference group in the model.

b. Pay Grade This variable seeks to identify the effect of promotion on the reenlistment decision. This variable describes the pay grade (E-1, E-2, E-3, E-4, E-5 or E-6) which can be equated to rank of the individual soldier at the time of reenlistment. Enlisted personnel in grades E-1 and E-2 are the lowest rank soldiers (Private 1 and Private 2 respectively). Members with the pay grade of E-3 are at the apprentice level and are first class privates. Soldiers in the pay grade of E-4 (Specialist 4 or CPL), E-5 (SGT) and E-6 (SSGT) are noncommissioned officers. They have demonstrated ability both in the technical aspects of their job and also as a leader (OSD, 1997, pp. 3-14). The reference case in the model is an E-4 soldier.

c. AFQTCAT As highlighted in the literature review, the services define high-quality recruits as high school graduates who score at or above the 50th percentile on the AFQT, that is, Categories I through IIIA. This variable in essence captures that high quality. The AFQT score measures both the individual's general

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cognitive ability to absorb military training and his potential performance or aptitude in the service.

The three categories in the model were constructed from the raw AFQT scores as follows:

(1) CAT I - AFQT percentile score 93-99.

(2) CAT II - AFQT percentile score 65-92.

(3) CAT IIIA - AFQT percentile score 50-64.

The reference category in the model is Category IIIA.

d. **FAMSTAT** This variable represents a soldier's family status and was created by combining the original variables, in the DMDC cohort files, that described the marital status and the number of dependents for each individual. The merging of these variables was necessary due to a multicollinearity problem between the original "marital status" and "dependent" variables. FAMSTAT was divided into four categories each represented by a dichotomous variable. The four categories were: single with no children (SNC), married with no children (MNC), single with children (SWC) and married with children (MWC). These categories were designed to be indicators of the increased responsibilities associated with family life. The reference category in the model is SNC.

e. **Bonus** The purpose of enlistment bonuses is to induce soldiers for service, in critical military specialties. The bonus program is a monetary incentive offered to qualified individuals who enlist in the Army for duty in a specific MOS. Enlistment bonuses are designed to increase the number of quality enlistments in MOSs that are critical and have inadequate first-term manning levels (US Army

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PERSCOM web site, 1999). The variable is coded with a one if a soldier received an enlistment bonus or zero otherwise. The reference category is soldiers that did not receive an enlistment bonus.

f.   Term   This variable is designed to measure the level of commitment of a soldier. By analyzing C-Group 1 personnel, only three-year and four-year contracts are considered. For this study the decision to reenlist was made sometime during the period 1992 and 1996, depending on the enlistment term and cohort. The reference category in the model contains soldiers who have contracted for a four-year-term.

g.   College   This variable is designed to capture the level of education a soldier has attained prior to enlisting in the Army. This variable can serve as a proxy to better understand an individual's motivation, aptitude and performance. Once again, by definition of C-Group 1 personnel, the data set was culled to reflect only those soldiers who enlisted in the Army and possessed at least a high school diploma. Consequently this is a dummy variable coded one, if a soldier had some college education, and zero if he had a high school diploma. The reference category in the model is a soldier who has a high school diploma.

h.   Technical Occupation   This variable was created from the enlisted DoD occupation codes, contained in the DMDC cohort files, and in accordance with the 1997 DoD Occupation Conversion Manual. The broad categories used by DoD are as follows (OSD, 1997):

(1)   Infantry, Gun Crews, and Seamanship Specialists (this includes the majority of combat arms personnel).

(2)   Electronic Equipment Repairers,

(3)   Communications and Intelligence Specialists,

(4)   Other Technical and Allied Specialists,

(5)   Functional Support and Administration,

(6)   Electrical/Mechanical Equipment Repairers,

(7)   Craftsmen,

(8)   Service and Supply Handlers, and

(9)   Non-occupational Category (includes primarily soldiers who are in basic or occupational training).

Historically, aptitude scores of personnel in the categories of Electronic Equipment Repairers, Communications and Intelligence Specialists, and other Technical and Allied Specialists have been higher than the scores of personnel in other categories (Eitelberg,1998). For the purpose of this study, a broad dummy variable, technical occupation, was created by grouping together the above three categories to capture another aspect of high-quality within the military. Such groupings were based statistically on quality trends, but this does not mean soldiers employed in the combat arms (Infantry, Armor, Artillery, Engineers) do not have technical jobs. Technical occupations were coded as one, while non-technical occupations were coded as zero. The reference category in the model is a soldier deemed to be employed in a technical occupation.

i.   **Army College Fund** A primary purpose of the ACF is to increase the quality and quantity of Army recruits. This dummy variable was created to capture the effect the ACF had on reenlistment. Those soldiers who did not receive the ACF were

coded as zero while those who did receive assistance from the ACF were coded as one. The reference category in the model is a soldier that did not receive the ACF.

j.   FY Cohort   There was sufficient evidence from the preliminary analysis to warrant including a dummy variable representing a soldier's cohort. This variable is designed to control for the effect on retention that can be associated with changes from one year to the next. The literature review suggested that military commanders are placing more emphasis on retention now when compared with the efforts at the beginning of the drawdown. The reference category in the model is a soldier in the FY 1990 cohort.

B.   HYPOTHESIZED RELATIONSHIPS

Based on the literature review and military judgment, it is possible to draw hypotheses regarding explanatory variables and their relationship to first-term reenlistment. Hypothesized effects are expressed below by a "(+)" or "(-)" to indicate a positive or negative effect, respectively, on reenlistment probability, holding other explanatory variables constant.

1.   Demographic Variables

a.   BLACK (+)   DoD is an equal opportunity employer, more so than many civilian employers. Job, training, and promotion opportunities tend to be better in the Army, when compared with similar opportunities in the civilian sector. Researchers (Finn 1988 and Buddin 1992) have, in fact, found higher reenlistment rates among black soldiers than among white soldiers.

b.   OTHER MINORITY (+)   For the same reasons as stated above, a high retention rate for other minorities is expected. However, for many cultural reasons, it is not expected that other minority groups would reenlist at quite as high a rate as would black soldiers.

c.   CAT I/II (-)   It is difficult to assess these variables, since all categories, including CAT IIIA are considered "high-quality." The military may hope that CAT I and CAT II soldiers would display a higher probability of reenlistment. However, it is hypothesized that, in general, soldiers in the higher categories would reenlist at lower rates. Soldiers who do not achieve the top category may have a stronger desire to succeed in the military. At the other end of the spectrum, soldiers who do achieve the top category may have a higher opportunity cost associated with remaining in the military, and they may use such talent to seek new challenges outside the military at the completion of their first-term.

d.   MNC, MWC, SWC (+)   It is hypothesized that soldiers who are married and/or have children generally have more responsibility and will place a greater emphasis on job security, compared with single soldiers, at a relatively young age. Across a large group of soldiers, it can be argued that soldiers with a family are likely to be more conservative about job changes and more career-minded. This may result from their concern for having a more stable lifestyle, in terms of job security, for their dependents.

e.   AGE (+)   It is hypothesized that older soldiers are generally more mature and stable. The majority of soldiers are in their early to mid-twenties at the reenlistment point. Soldiers in their later-twenties should display a higher probability of reenlisting, compared with the average-aged soldier.

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f.   COLLEGE (-)   It is generally assumed that soldiers who possess a college degree are more marketable in the civilian world (in terms of job mobility), when compared with soldiers who do not possess a degree. Soldiers who have attempted college education, but have not completed it, may not be as committed to a long-term career. Recall, soldiers who do not possess a high school diploma are not included in this study, by the definition of C-Group 1. It is therefore hypothesized, that soldiers who had received some college education would display a lower probability of reenlisting, compared with soldiers who possessed only a high school diploma.

g.   FY Cohort   It is hypothesized that soldiers in more recent cohorts would display a greater probability to reenlist. This is due to the slowing of the drawdown and also because commanders are now more focussed on retaining quality soldiers.

2.   Military Experience Variables

a.   E-1, E-2, E-3 (-)   Promotion is the best reward an individual can be given and in general everyone likes to succeed. When compared with soldiers who have been promoted to E-4 during their first-term, it is hypothesized soldiers in lower pay grades would have a lower probability of reenlisting.

b.   E-5, E-6 (+)   During the first term, there are not many soldiers at these pay grades. Nevertheless, such soldiers are assessed to have a great deal of potential, and it is hypothesized that they would have a greater probability of reenlisting when compared with a soldier at the pay grade of E-4.

c. **ENLISTMENT BONUS (+)** Persons who receive a bonus upon enlistment in the Army are likely to be highly desirable candidates for reenlistment. It is hypothesized that this benefit would have a positive effect on retention.

d. **TERM (-)** The shorter the initial contract period, the less committed a soldier would appear in terms of a longer career. It is hypothesized that a soldier who enlisted for an initial 3-year-term would display a lower probability of reenlisting, compared with a 4-year-term enlistee.

e. **TECHNICAL OCCUPATION (+)** Generally, soldiers employed in a more technical occupation have been job-matched, and they likely have greater job satisfaction. Furthermore, the Army is very keen to retain their services. It is hypothesized that soldiers with predominantly more technical-related skills, such as those electronic equipment repairers, soldiers in communications and intelligence, and those in certain other technical areas are considered to be more highly-qualified and would be more likely to reenlist when compared with soldiers in less technical specialties. This hypothesis is, however, not as clear cut as some others, since soldiers who have received more technical training may also be more employable and marketable in the civilian sector. Further, there are many young soldiers who enlist for an "action-packed" adventure for three or four years, and may have no desire to reenlist from the beginning, regardless of the type of training they receive.

f. **ACF (-)** As with the enlistment bonus, the ACF is an attractive tool to enlist. At the same time, research (Gilroy, 1986) suggests that personnel who receive a college fund allowance (essentially a post-service benefit) may display lower reenlistment rates to make maximum use of the allowance. It is therefore

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hypothesized that personnel who received a college fund allowance would display a lower probability of reenlisting, compared with personnel who received no college fund.

C. BASE CASE

As discussed above, a base case needs to be established to provide a reference point to determine probabilities for the remaining variables. The most common occurring characteristics identified in the preliminary analysis, from C-Group 1 soldiers, were used to establish a reference point. In summary, the base case used in this analysis, is a male soldier described as follows:

1.   White,

2.   Achieved the pay grade of E-4 at the time of reenlistment,

3.   Achieved CAT III on the AFQT,

4.   Family Status was deemed to be single with no children,

5.   Received no enlistment bonus,

6.   Enlisted initially for four years,

7.   Average age (20.01 years) at time of enlistment,

8.   Possessed a high school diploma,

9.   Employed in a non-technical occupation,

10.   No ACF assistance, and

11.   FY 1990 cohort.

D. RESULTS

Table 6 presents the LOGIT model results for the combined cohorts.

Table 6. Summary of Variables and Reenlistment Probabilities

Variable	Expected Sign	Coefficient	Wald Statistic	Significance Level	Probability Change (Percent)
Intercept		-.1696	3.0743		
Black	+	.5483	284.1571	**	13.6
Other Minority #	+	.0477	.9794		1.2
E-1	-	-3.8804	462.2052	**	-39.7
E-2	-	-3.4413	1224.761	**	-39.0
E-3	-	-1.9019	1235.451	**	-31.7
E-5	+	2.0758	22.0936	**	12.1
E-6	+	.4865	185.7187	**	43.6
AFQT Category I	-	-.3085	42.9134	**	-7.2
AFQT Category II	-	-.1013	18.0781	**	-2.4
MNC	+	.509	244.0263	**	12.6
SWC	+	.5034	47.8116	**	12.5
MWC	+	.7033	577.5762	**	17.4
Enlistment Bonus	+	-.0846	4.5083	*	-2.0
Enlistment Term	-	.4715	294.9371	**	11.7
Age	+	-.0095	3.9761	*	-0.6
College	-	-.3952	88.6993	**	-9.1
Technical Occupation #	+	-.0291	1.2787		-0.7
ACF	-	-.0538	4.8019	*	-1.3
FY 1991 Cohort	+	.0829	8.8171	**	6.7
FY 1992 Cohort	+	.1672	35.6438	**	8.8

Source: Derived from merging the STF database and DMDC cohort files.

** Significant at one percent level
* Significant at five percent level
# Not Significant

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Table 6 summarizes the explanatory variables of the model, expected signs, key model output data, and the change in the probability of reenlistment for each variable when compared with the base case. The logistic coefficients can be interpreted as the change in log odds associated with a change in the categorical independent variables from the reference category, or a one-year change for the continuous variable, age. The logistic coefficients have been converted into a more meaningful change in probability of reenlistment for each variable. For example, the model concludes that black men within C-Group 1 are 13.6 percentage points more likely to reenlist than their white counterparts after accounting for the differences in all other variables in the model. The Wald statistic can be interpreted as a "pseudo t^2-statistic." In this situation, the Wald statistic is just the square of the ratio of the coefficient to its standard error (labeled "S.E" in appendix B). Detailed significance levels for each variable are also shown in Appendix B in the column labeled "Sig."

All variables in the model are significant at the .01 percent significance level except for age, technical occupation, other minorities, and ACF. ACF and age, however, are significant at the .05 percent significance level. The only variables in the model that are not significant are broad military occupation and other minorities. Thus, there is no effect on the decision to reenlist if the soldier is in a technical versus a non-technical occupation. Nor is there any effect on the likelihood to reenlist if the soldier is from a minority race other than black. There is no evidence that the lack of significance was caused by statistical problems such as multicollinearity.

The model indicates several variables had a negative influence, to varying degrees, on the probability of reenlistment for C-Group 1 personnel. Having a lower pay grade at the time of reenlistment (E-1, E-2, E-3), had a substantial negative influence (greater than 30 percentage points) on the probability of reenlistment. Factors that had a slightly negative influence (between 2 and 10 percentage points) on the probability of reenlistment were:

1. Having scored in the higher two AFQT categories (CAT I, CAT II),

2. Having received some college education, and

3. Having received an enlistment bonus.

Factors that had a small negative (less than 2 percentage points), but still statistically significant, influence on the probability of reenlistment were:

1. Having received ACF assistance, and

2. Being older than the average soldier.

The only factor to have had a substantial positive influence (greater than 30 percentage points) on the probability of reenlistment was being at a higher pay grade (E-6). Factors that had a moderately positive influence (between 10 and 20 percentage points) on the probability of reenlistment were:

1. Being married or having children,

2. Being black,

3. Having achieved the pay grade of E-5, and

4. Having enlisted for only a three-year first-term.

Belonging to a later cohort (FY 1991 or FY 1992) was the only factor to have a slightly positive influence (between 2 and 10 percentage points) on the probability of reenlistment.

The majority of variables in the model displayed the expected influence on the probability of reenlistment, as hypothesized earlier in the chapter. There were, however, a number of surprising results for three variables that had the opposite effect to what was expected. The most significant of these was that soldiers who enlisted for a shorter first-term contract displayed a higher probability of reenlisting. It should be noted that, when the model was run using only FY 1991 data, the result of the enlistment term variable was exactly as hypothesized. The reason why a three-year enlistment results in a higher reenlistment rate is an area for further analysis. The only other variables that behaved differently to what was hypothesized were Enlistment Bonus and Age. This is not an area for concern, because both of these variables had less than 2 percentage points of negative influence on the probability of reenlistment, when it was hypothesized they should have a positive influence. These variables were significant at the .05 percent significance level, but they were not significant at the .01 percent significance level (refer to Appendix B). While the results are statistically significant, the small predicted change in the probability of enlistment may indicate that the results were not practically significant. The best interpretation is that these variables are not stable predictors of reenlistment.

In summary, based on both the level of statistical significance and change in probability from the base case, the most important demographic and military experience predictors of reenlistment are: pay grade, family status, race, enlistment term, education, and AFQT Category. All of these variables (except for enlistment term, as previously explained) were found to influence reenlistment as originally hypothesized.

VI. CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS

This study presents information and analysis pertaining to the reenlistment decisions of first-term, C-Group 1 soldiers in FY 1990, FY 1991 and FY 1992 cohorts. Frequency charts and cross-tabulation analysis were used to initially identify variables that are likely predictors of reenlistment behavior. A logistic regression model was estimated to determine the relative importance of explanatory variables on the retention decision. Available data suggest that, even during the period of downsizing, the percentage of soldiers categorized in C-Group 1 increased across cohorts. Among C-Group 1 personnel, the proportion of soldiers who were eligible to reenlist (and had not attrited before their initial contract) remained slightly above 50 percent for each cohort. In general, there was a steadily increasing trend for first-term reenlistment (41.4 percent in 1990, 44.4 percent in 1991, and 45.4 percent in 1992).

The most significant demographic and military experience predictors of reenlistment for C-Group 1 personnel in the three cohorts were pay grade, family status, race, length of first-term enlistment, education, and AFQT Category. Pay grade was an extremely strong predictor of reenlistment. This implies that the inherent promotion process within the Army is an effective tool to shape the force beyond the first-term of enlistment.

The Army's goal of keeping highly-qualified soldiers beyond the first tour is certainly being achieved. However, mixed results were found within the highly-qualified

category of C-Group 1 soldiers. Even though the reenlistment rates of AFQT Category 1 soldiers remained relatively constant over successive cohorts, an emerging trend was that soldiers in a higher AFQT category actually appeared less likely to reenlist when compared with those in lower AFQT categories. Similarly, soldiers with some college education appeared less likely to reenlist compared with soldiers who possessed a high school diploma. Participating in the Army College Fund was significant at the .05 percent level in terms of predicting a lower reenlistment rate. This suggests that there is an underlying incentive for soldiers to leave the Army if they have an ACF benefit. This should not be surprising since the ACF is essentially for post-service use.

Finally, race continues to be a significant predictor for first-term reenlistment and coincides with earlier research (Cooke and Quester, 1992). Black soldiers are more likely to reenlist compared with their white counterparts, and the gap between the races appears to be widening.

B.   RECOMMENDATIONS FOR FUTURE RESEARCH

Based on these findings, the following recommendations are offered. The regression model could be enhanced in many ways. Economic variables such as civilian-military pay ratios and unemployment rates are undoubtedly linked to the retention decision. A concurrent economic projection of Army personnel strength study (Hildebrandt and Sze, 1999) utilizes the same US Army STF database. Further analysis could incorporate results, particularly the time-lag associated with economic variables, from this cross-sectional time-series analysis.

The military at the turn of the century must face a generation of young people who have little or no connection to military life, and recruiting is likely to become even more difficult in the years ahead. At the same time, personnel retention will consume more time for manpower planners and be of greater importance, particularly if the Army is to maintain a high-quality force. Additional characteristic groups and more recent cohorts could be examined by using the current model to predict first-term reenlistment. Such analysis could be enhanced by incorporating more qualitative factors such as military attitudes concerning service life. Field research or surveys could also be used to obtain more current and qualitative data.

Finally, since pay grade appears to be one of the key influencers on reenlistment, further exploratory analysis could be conducted using pay grade as a dependent variable. Multi-nomial analysis could then be used to identify the variables that influence a soldier's promotion tempo.

APPENDIX A: CROSS-TABULATION ANALYSIS CHARTS

A.   INTRODUCTION

This appendix shows the results of preliminary cross-tabulation analysis on the merged STF and DMDC FY1990, FY1991 and FY1992 cohort files. As a reminder to the reader analysis was conducted on C-Group 1 personnel who were eligible to make a reenlistment decision. It does not include personnel who attrited early, that is, prior to completing their first-term of obligated service. Results for all three cohorts are graphically depicted in the figures below in terms of percentages.

B.   1990 COHORT

1.   Frequency

Figure 1 illustrates the racial make-up of the 1990 cohort. Whites account for 79 percent of soldiers, and blacks and other minorities comprise 15.5 percent and 5.5 percent, respectively.
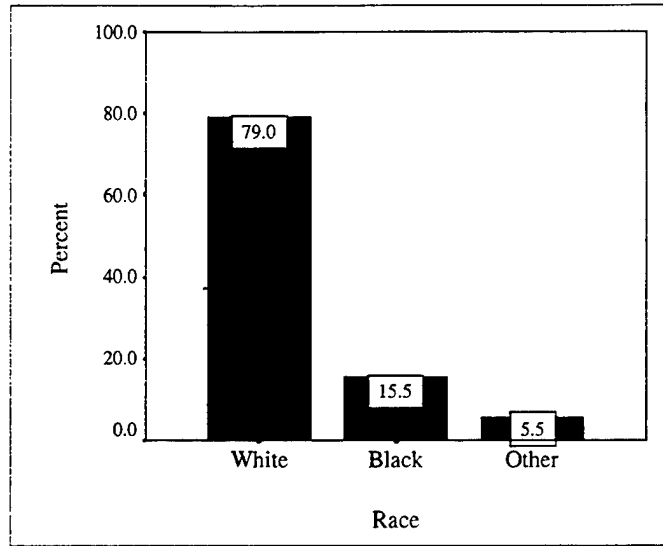
Figure 1. 1990 Cohort Frequency by Race

Figure 2 indicates that 68.6 percent of soldiers achieved the pay grade of E-4 at the completion of their first term of enlistment. Another 11.4 percent were promoted to E-5, while only a very few (0.2 percent) achieved E-6.
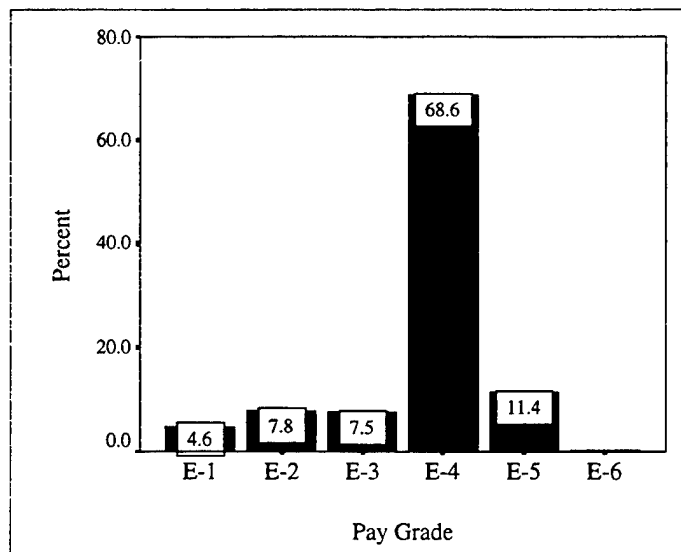
Figure 2. 1990 Cohort Frequency by Pay Grade

Figure 3 shows the family status of the 1990 cohort. As seen here, 64.4 percent of soldiers remained single and had no children during their first term of enlistment. At the same time, 19.1 percent of soldiers were married with no children, and an additional 14.6 percent of soldiers were married with children at the first-term reenlistment point.
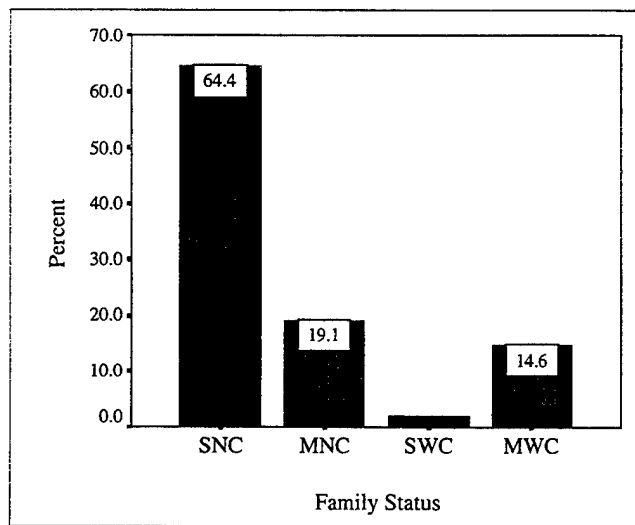
Figure 3. 1990 Cohort Frequency by Family Status

Figure 4 shows the AFQT categories of enlistees in the 1990 cohort. The majority (51.9 percent) were in Category II and only 7 percent were in Category I. Remember this analysis, was an examination of C-Group 1 personnel only, and by definition, included only soldiers in the top three AFQT categories.
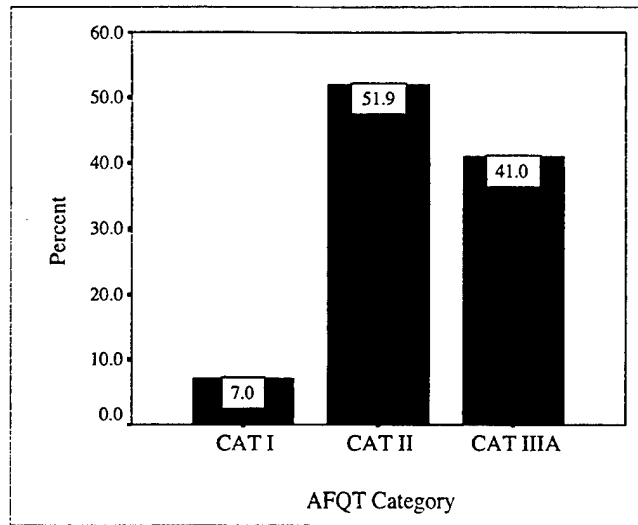
Figure 4. 1990 Cohort Frequency by AFQT Category

Figure 5 indicates that approximately two-thirds of soldiers enlisted for a four-year

term. At the same time Figure 6 shows that the vast majority of soldiers (nearly 87

percent) did not receive an enlistment bonus.
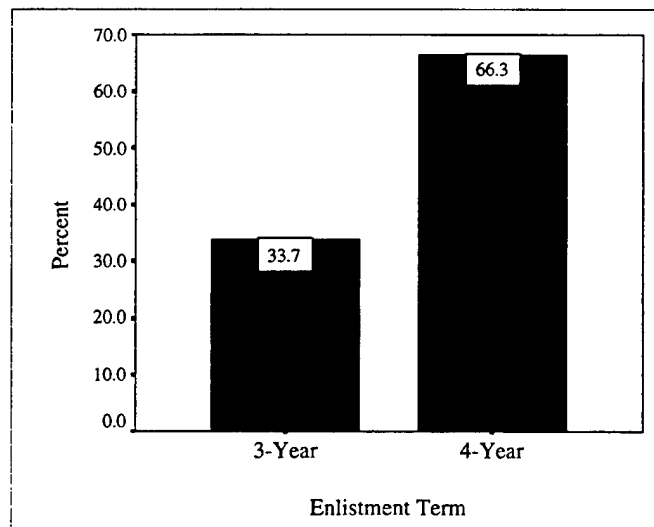
Figure 5. 1990 Cohort Frequency by Enlistment Term
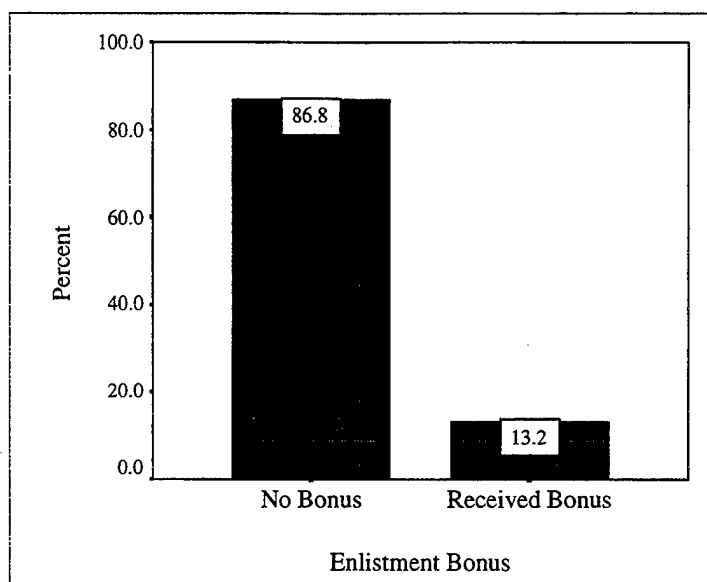
Figure 6. 1990 Cohort Frequency by Enlistment Bonus

Figure 7 shows that 91.6 percent of the soldiers who enlisted possessed a high school diploma and another 8.4 percent had some college education. Remember, soldiers that did not possess a high school diploma were not included in this study.
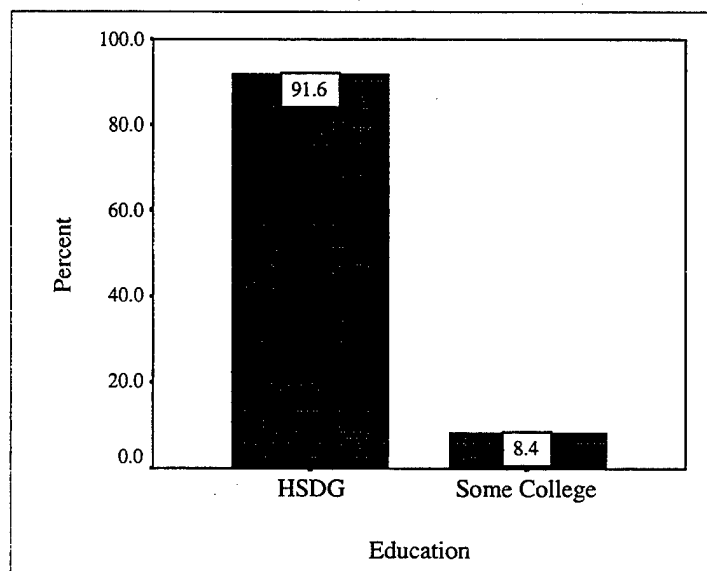
Figure 7. 1990 Cohort Frequency by Education

Figure 8 indicates the majority of soldiers were employed in non-technical occupations. Soldiers were deemed to be employed in technical occupations if their primary job was in one of the following categories: Electronic Equipment Repairer, Communications and Intelligence Specialist, or other Technical and Allied Specialist. If soldiers were not employed in one of these categories they were deemed to be in a non-technical occupation. These broad job categories are defined in the 1997 Department of Defense Occupation Conversion Manual, and are further described in Chapter V of this thesis.
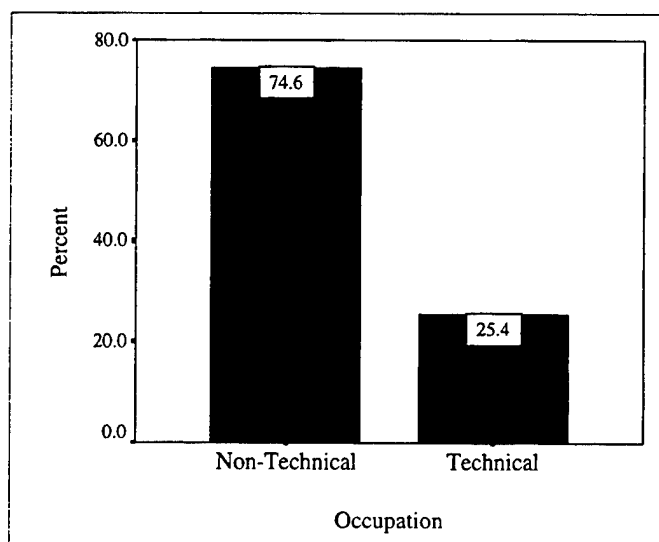
Figure 8. 1990 Cohort Frequency by Occupation

Figure 9 indicates that slightly over one-third of soldiers enlisted at 18 years of age, while three-quarters of enlistments were for recruits under 20 years of age. The mean age at enlistment was 19.73 years, and the median was 19 years.
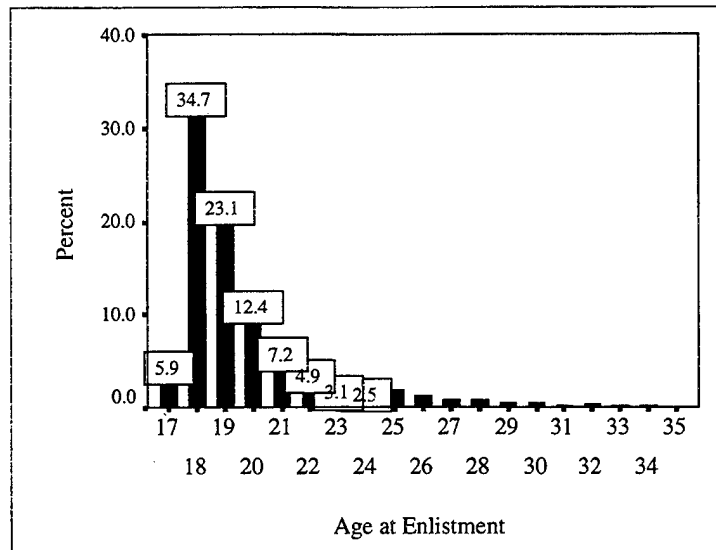
Figure 9. 1990 Cohort Frequency by Entry Age

Figure 10 shows that 40.4 percent of soldiers who were eligible for reenlistment had received the Army College Fund (ACF).
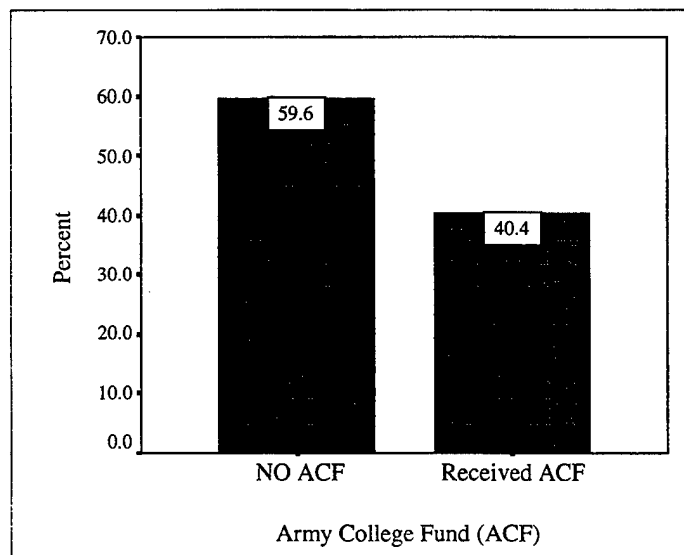
Figure 10. 1990 Cohort Frequency by Army College Fund

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Finally, Figure 11 indicates that 41.4 percent of high-quality, C-Group-1, soldiers who made it through their first term of enlistment went on to reenlist.
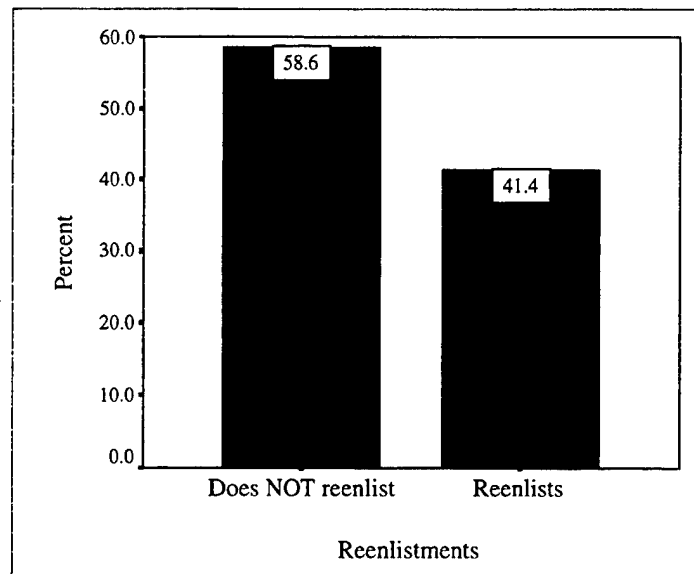
Figure 11. 1990 Cohort Frequency by Reenlistment

2.   Cross Tabulation

The purpose of cross tabulating the data from the STF cohort file is to begin to form an idea about what kinds of variables are likely predictors of reenlistment behavior. Such variables are then included in the logistic regression model, in order to isolate other variables. Results are graphically depicted below.

Figure 12 illustrates the 1990 cohort reenlistment rate by race. Black soldiers tended to reenlist at a greater rate than did their white counterparts. The majority (53 percent) of black soldiers reenlisted, while only 39 percent of white soldiers did the same.
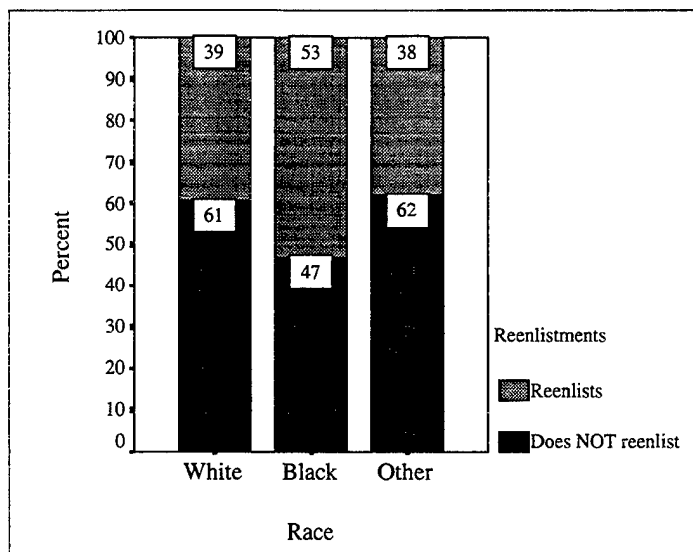
Figure 12. 1990 Cohort Reenlistment Rate by Race

Figure 13 illustrates the 1990 cohort reenlistment rate by pay grade. The vast majority of soldiers who did not get promoted beyond E-3, and were eligible to reenlist, did not reenlist. The higher a soldier's pay grade, the greater was his reenlistment rate.
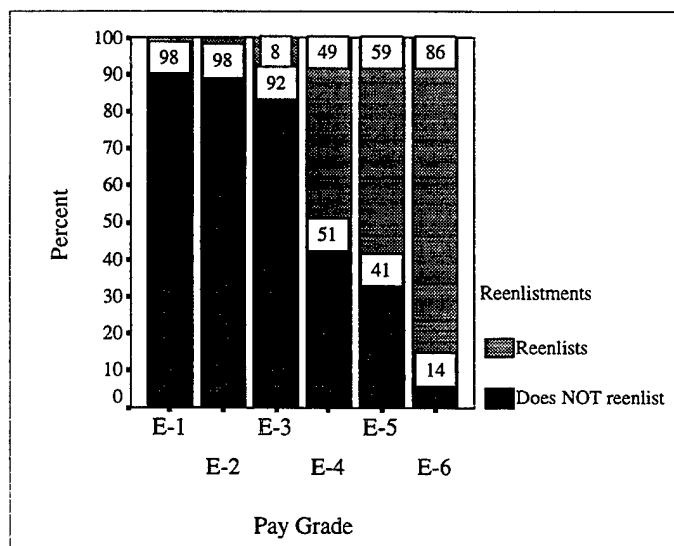
Figure 13. 1990 Cohort Reenlistment Rate by Pay Grade

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Figure 14 presents the rate of reenlistment by AFQT Category. As a soldier's

AFQT category decreased, the reenlistment rate increased.
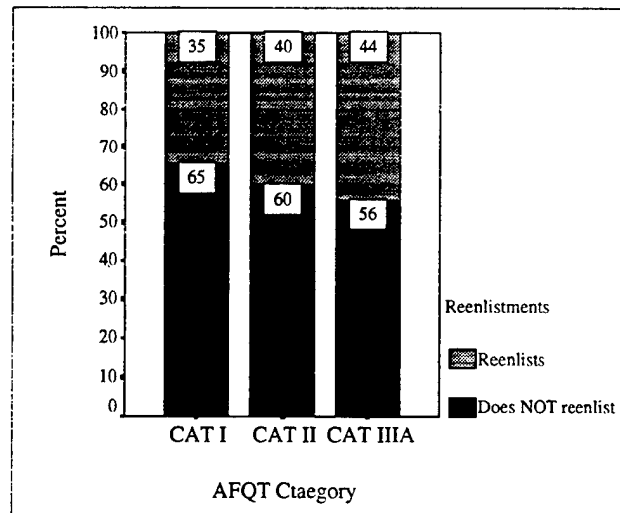
Figure 14. 1990 Cohort Reenlistment Rate by AFQT Category

Figure 15 illustrates the rate of reenlistment by family status. Married soldiers

displayed a higher rate of reenlistment when compared with their single counterparts. In

general, soldiers with dependents reenlisted at a higher rate than did single soldiers in the

FY 1990 cohort.
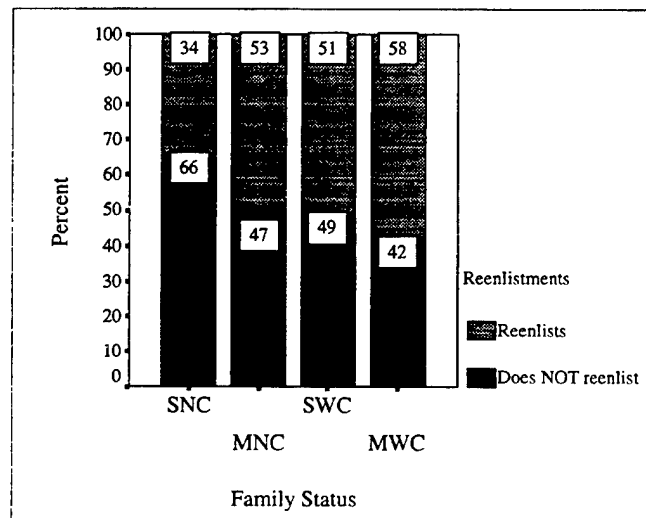
Figure 15. 1990 Cohort Reenlistment Rate by Family Status

Figure 16 illustrates the rate of reenlistment by occupation. There appears to be virtually no difference in rates of reenlistment between soldiers deemed to be employed in a technical occupation, compared with those in a non-technical occupation.
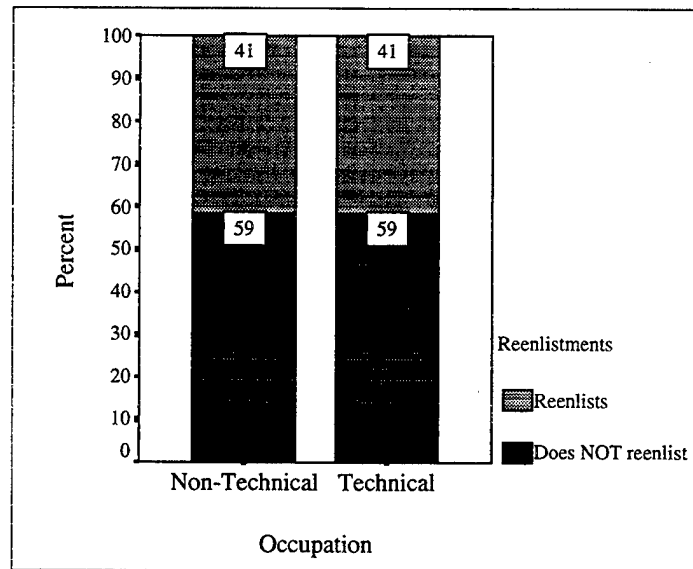
Figure 16. 1990 Cohort Reenlistment Rate by Occupation

Figure 17 depicts reenlistment rates by entry age. Only enlistments between the ages of 18 and 23, inclusive, are displayed (this accounts for 85.4 percent of the 1990 cohort). Generally, the observed trend is that older soldiers tend to reenlist at a slightly higher rate. This is particularly evident when comparing teenagers at the initial enlistment point to soldiers who were 20 and over.
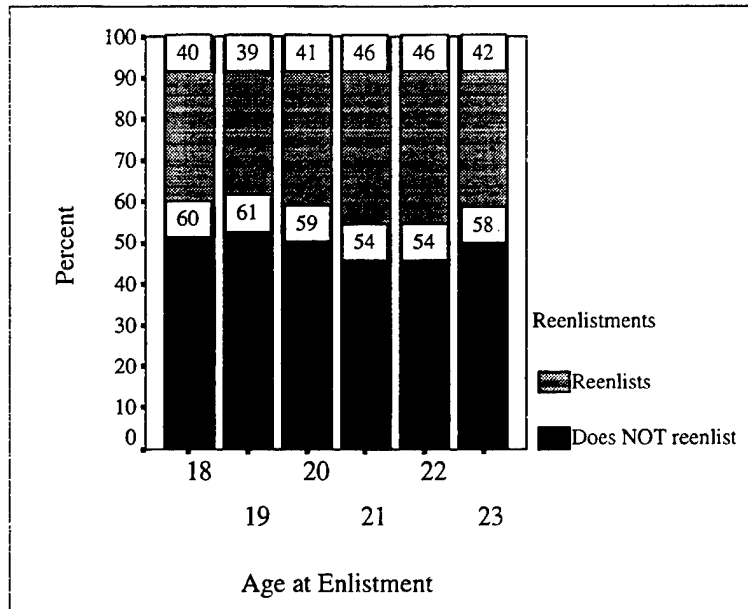
Figure 17. 1990 Cohort Reenlistment Rate by Entry Age

Figure 18 shows that soldiers from the FY 1990 cohort who received an enlistment bonus tended to reenlist at a slightly greater rate than did those without a bonus.
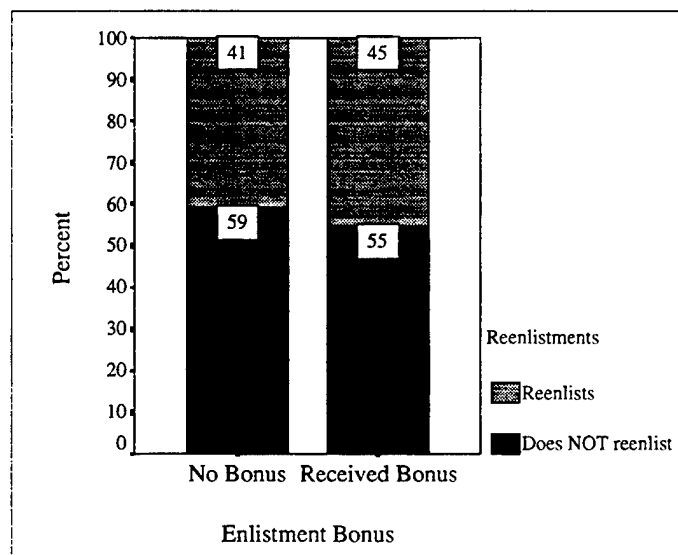
Figure 18. 1990 Cohort Reenlistment Rate by Enlistment Bonus

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Figure 19 indicates that soldiers who completed an initial 4-year term of service, reenlisted at a higher rate than did those who only completed an initial 3-year term of service.
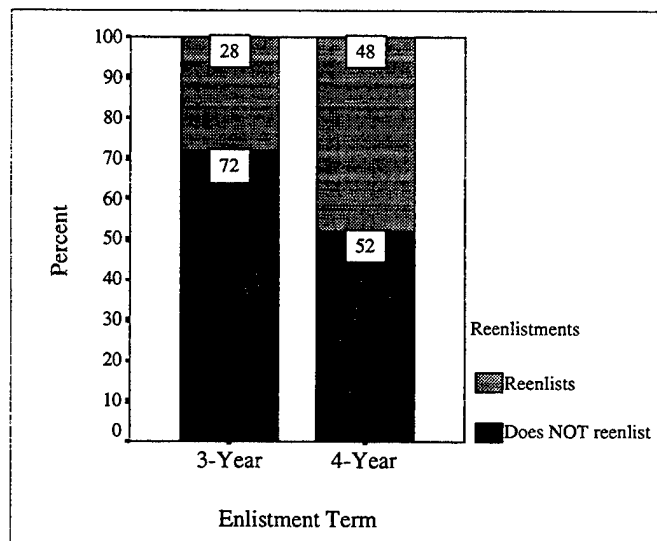
Figure 19. 1990 Cohort Reenlistment Rate by Enlistment Term

Figure 20 indicates there is virtually no difference in the reenlistment rates of soldiers in FY 1990 cohort by the education categories of HSDG and some college.
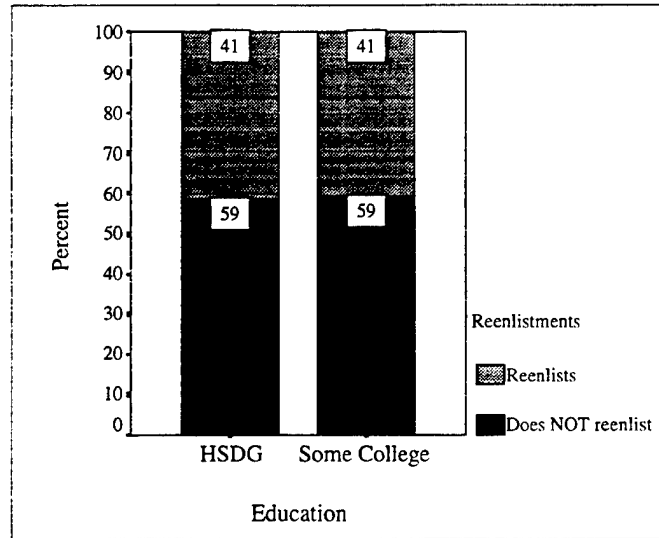
Figure 20. 1990 Cohort Reenlistment Rate by Education

Figure 21 suggests that the Army College Fund may provide an incentive for soldiers to leave the Army after the first term, although the difference in the reenlistment rates are not particularly large (9 percentage points here, compared with 20 percentage points for enlistment term, as seen in Figure 19).
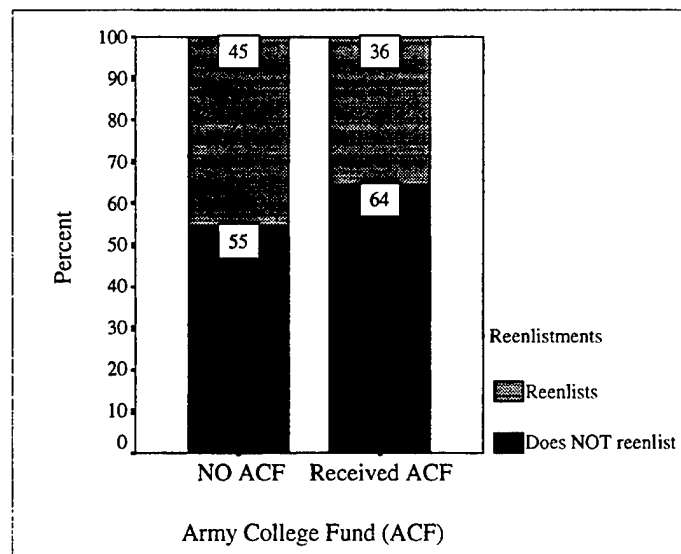
Figure 21. 1990 Cohort Reenlistment Rate by Army College Fund

C. 1991 COHORT

1. Frequency

Figure 22 illustrates the racial make-up of the 1991 cohort. Whites account for 80.9 percent of soldiers, and blacks and other minorities comprise 13.5 percent and 5.5 percent, respectively.
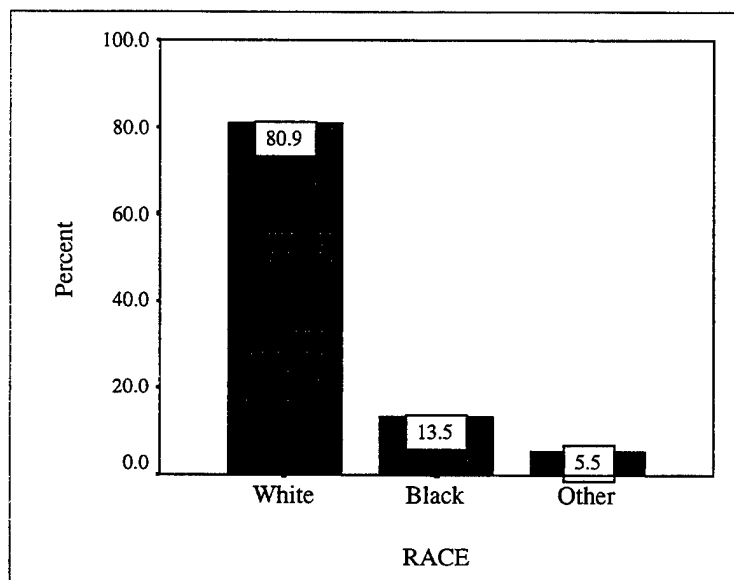
Figure 22. 1991 Cohort Frequency by Race

Figure 23 indicates that 69.4 percent of soldiers achieved the pay grade of E-4 at the completion of their first term of enlistment. Another 13.7 percent were promoted to E-5, while only a very few (0.1 percent) achieved E-6.
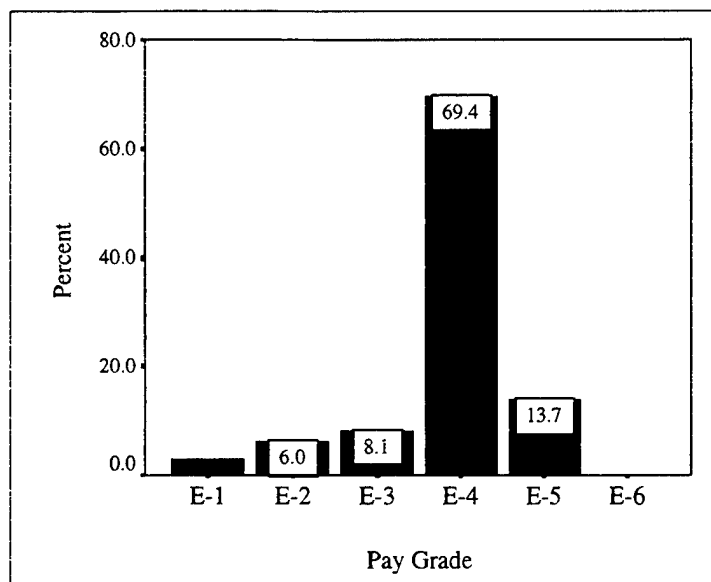
Figure 23. 1991 Cohort Frequency by Pay Grade

Figure 24 shows the family status of the 1991 cohort. As seen here, 63 percent of soldiers remained single and had no children during their first term of enlistment. At the same time 19.8 percent were married with no children, and an additional 14.8 percent were married with children at the first-term reenlistment point.
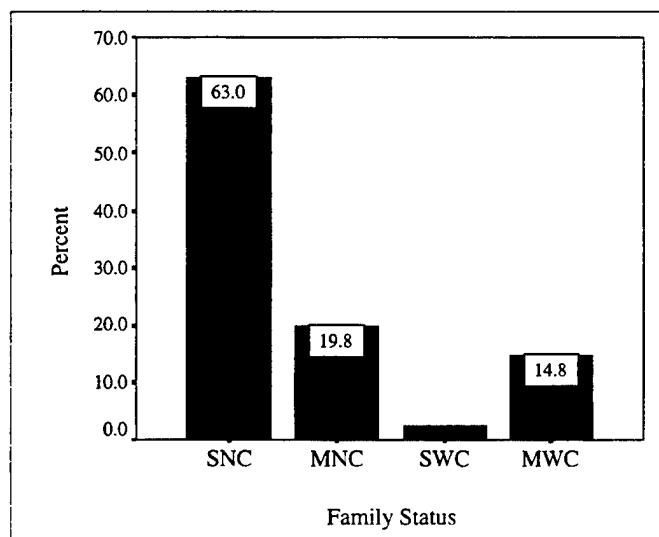
Figure 24. 1991 Cohort Frequency by Family Status

Figure 25 shows the AFQT categories of C-Group 1 enlistees in the 1991 cohort.

The majority (52.7 percent) were in Category II and only 7.0 percent were in Category I.
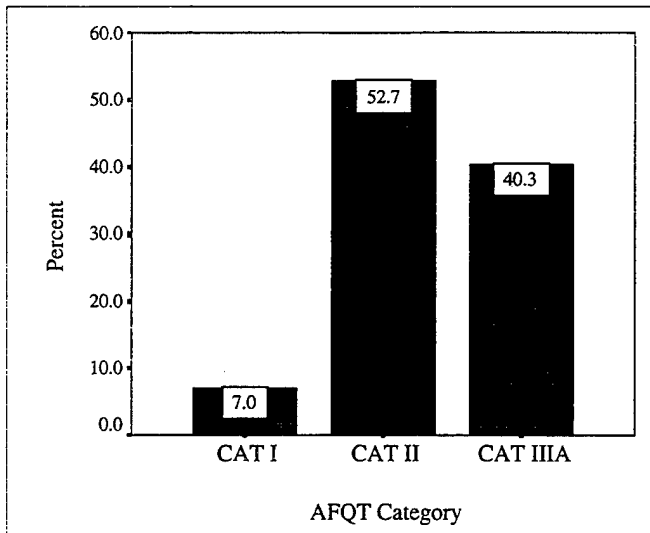
Figure 25. 1991 Cohort Frequency by AFQT Category

Figure 26 indicates the majority of soldiers enlisted for a four-year term, and at the

same time Figure 27 shows that the vast majority of soldiers (slightly over 91 percent) did

not receive an enlistment bonus.
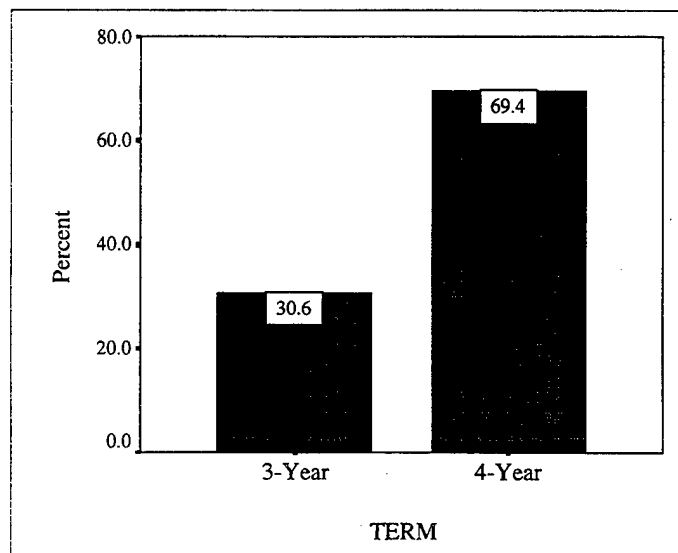
Figure 26. 1991 Cohort Frequency by Enlistment Term
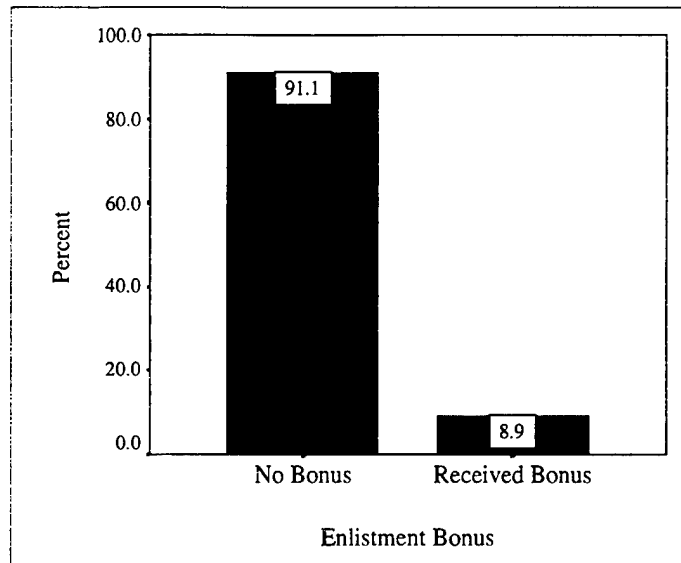
Figure 27. 1991 Cohort Frequency by Enlistment Bonus

Figure 28 shows that 91.1 percent of the C-Group 1 soldiers who enlisted possessed

a high school diploma and another 8.9 percent had some college education.
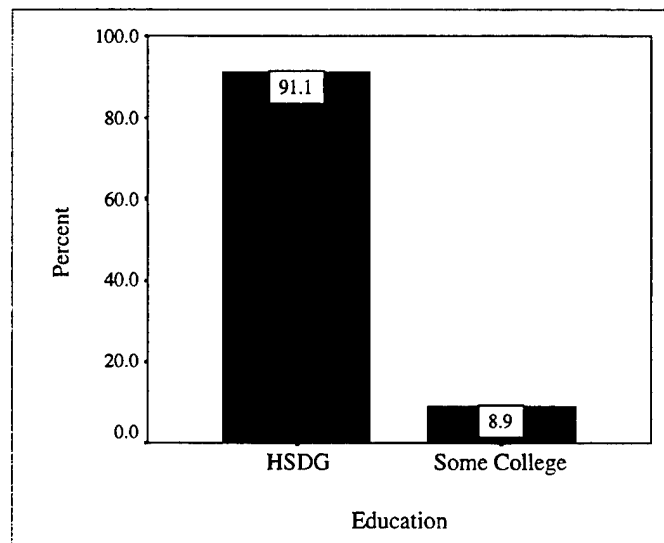
Figure 28. 1991 Cohort Frequency by Education

Figure 29 indicates the majority of soldiers were employed in non-technical occupations, as defined previously for the FY 1990 cohort.
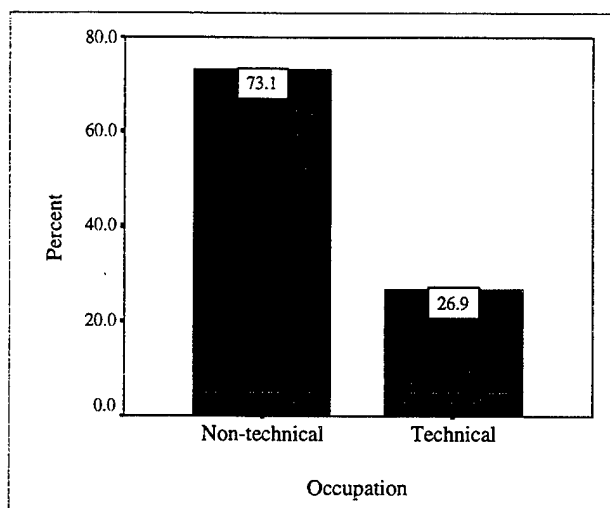
Figure 29. 1991 Cohort Frequency by Occupation

Figure 30 indicates the majority of soldiers enlisted at 18 years of age, and 90 percent of soldiers were under 23 years of age. The mean enlistment age was 19.1 years and the median age at enlistment was 19 years.
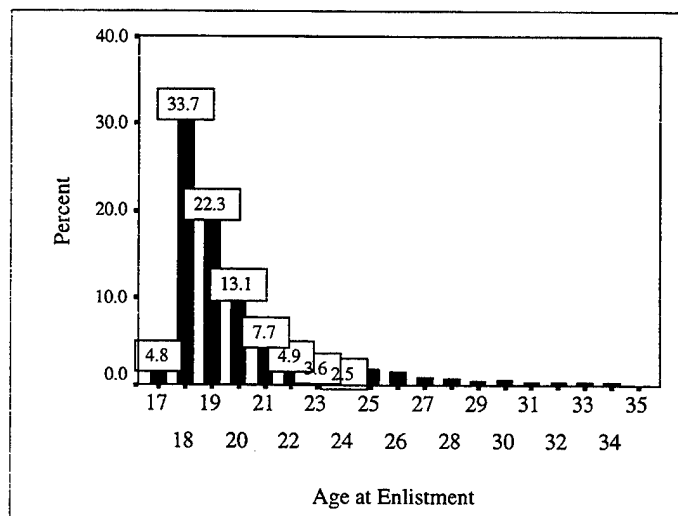
Figure 30. 1991 Cohort Frequency by Entry Age

Figure 31 shows that the slight majority (51 percent) of soldiers who were eligible

for reenlistment had received the Army College Fund (ACF).
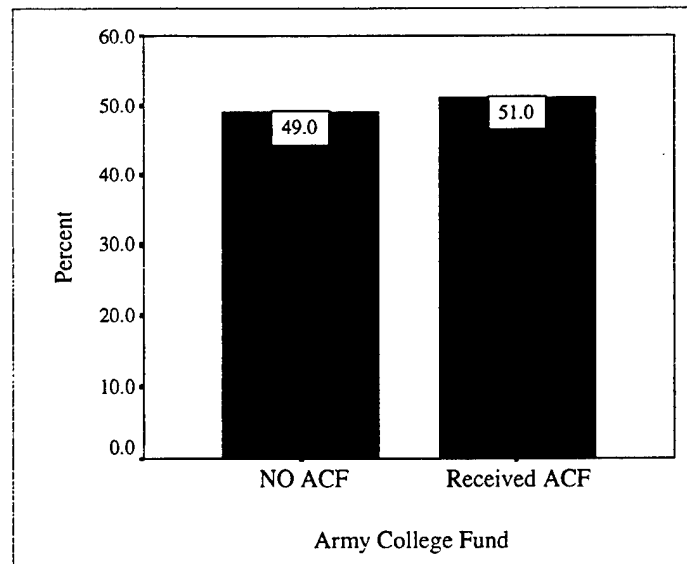
Figure 31. 1991 Cohort Frequency by Army College Fund

Finally, Figure 32 indicates that 44.4 percent of high-quality, C-Group-1, soldiers

who made it through their first term of enlistment went on to reenlist.
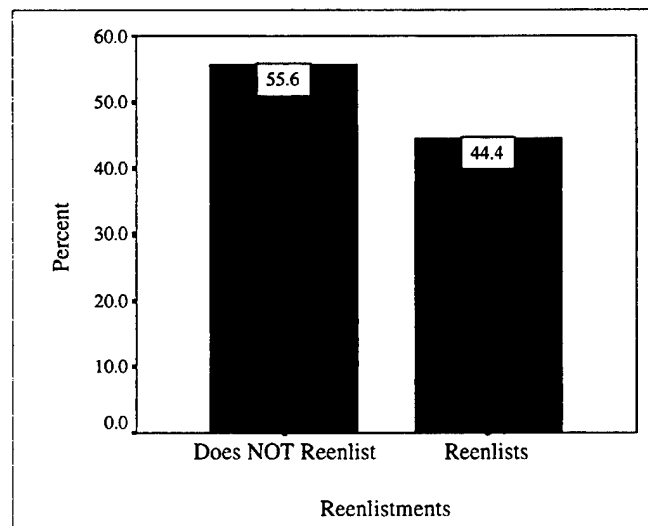
Figure 32. 1991 Cohort Frequency by Reenlistment

2. Cross Tabulation

Figure 33 illustrates the 1991 cohort reenlistment rate by race. Black soldiers tended to reenlist at a greater rate than did their white counterparts. The majority (57 percent) of black soldiers reenlisted compared with only 42 percent of white soldiers and other races.
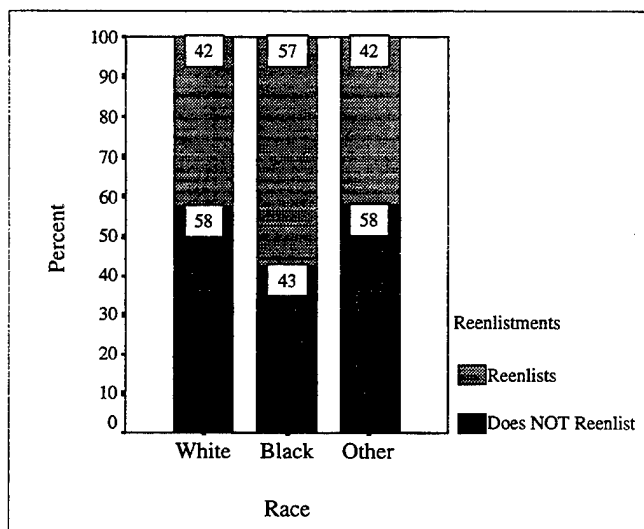
Figure 33. 1991 Cohort Reenlistment Rate by Race

Figure 34 illustrates the 1991 cohort reenlistment rate by pay grade. The vast majority of soldiers who did not get promoted beyond E-3, and were eligible to reenlist, did not reenlist. In general, the higher a soldier's pay grade, the greater was his reenlistment rate.
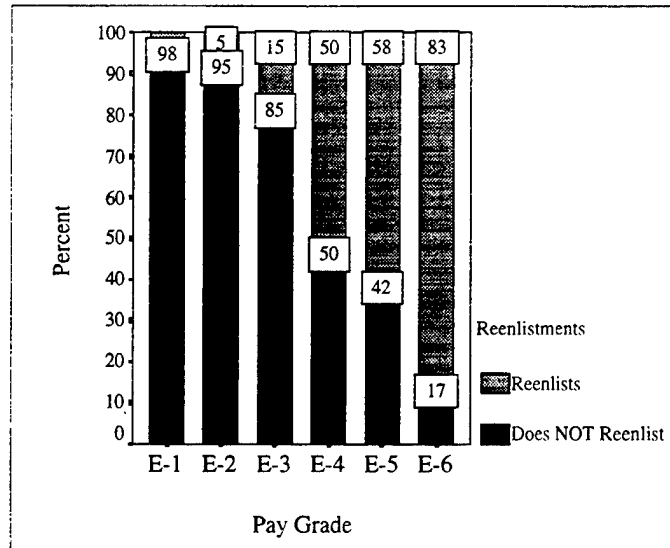
Figure 34. 1991 Cohort Reenlistment Rate by Pay Grade

Figure 35 presents the rate of reenlistment by AFQT Category. As a soldier's

AFQT category decreased, his reenlistment rate increased.
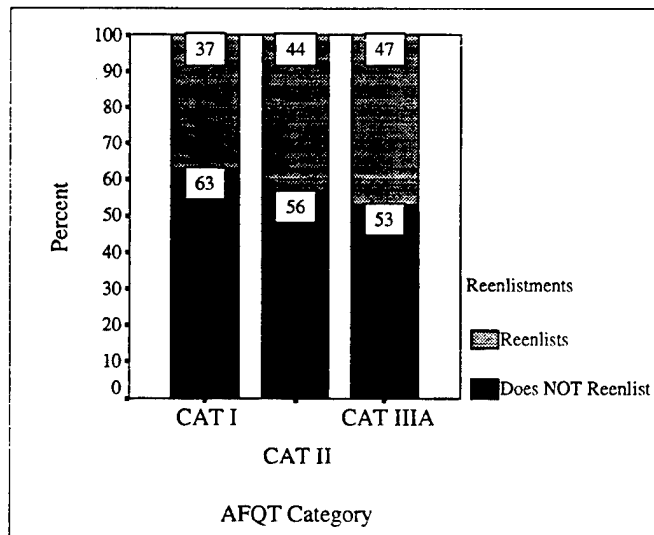
Figure 35. 1991 Cohort Reenlistment Rate by AFQT Category

Figure 36 illustrates the rate of reenlistment by family status. Married soldiers

displayed a higher rate of reenlistment when compared with their single counterparts. In

86

general, soldiers with dependents reenlisted at a higher rate than did single soldiers in the

FY 1991 cohort.
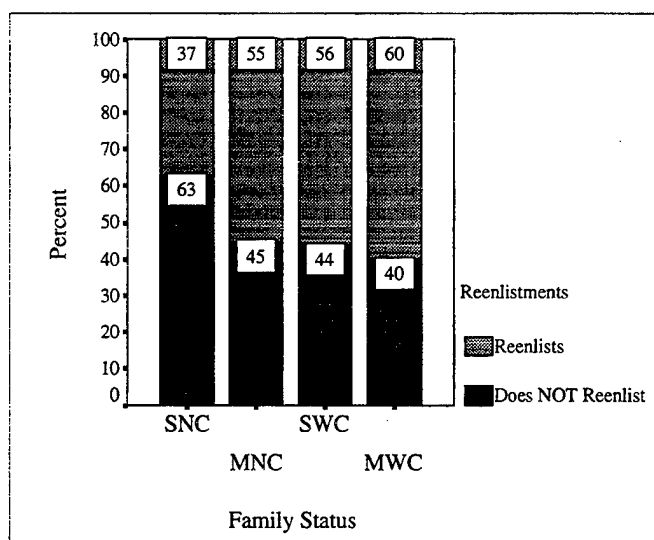
Figure 36. 1991 Cohort Reenlistment Rate by Family Status

Figure 37 illustrates the rate of reenlistment by occupation. Soldiers deemed to be employed in a technical occupation reenlisted at a slightly higher rate compared with soldiers in a non-technical occupation. Remember the majority of soldiers were employed in non-technical occupations, according to the earlier definition.
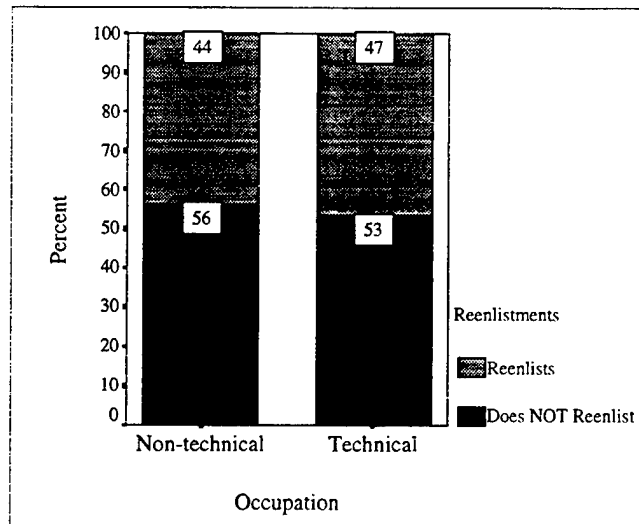
Figure 37. 1991 Cohort Reenlistment Rate by Occupation

Figure 38 depicts reenlistment rates by entry age. Only enlistments between the ages of 18 and 23, inclusive, are displayed (this accounts for 85.3 percent of the 1991 cohort). In this case, the earlier trend from the FY 1990 cohort, that older soldiers reenlisted at a greater rate is only slightly evident for the FY 1991 cohort.
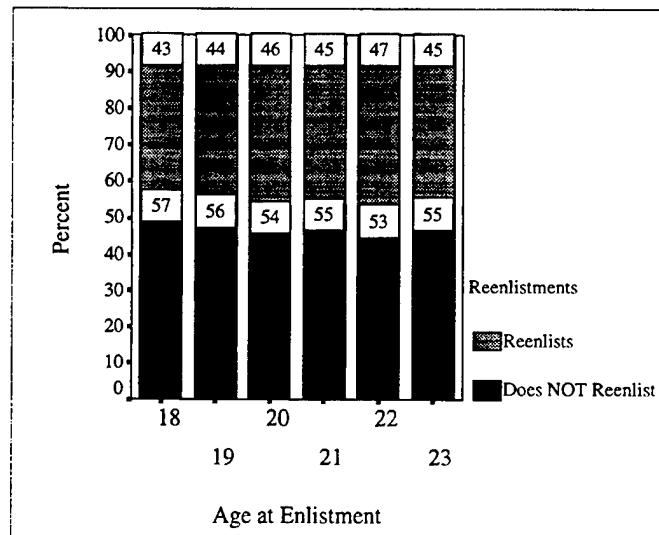
Figure 38. 1991 Cohort Reenlistment Rate by Entry Age

Figure 39 shows that soldiers who received an enlistment bonus tended to reenlist at a slightly greater rate than those without a bonus, while Figure 40 indicates 50 percent of 4-year first-term soldiers reenlisted compared with only 31 percent of 3-year first-term soldiers for the FY 1991 cohort.
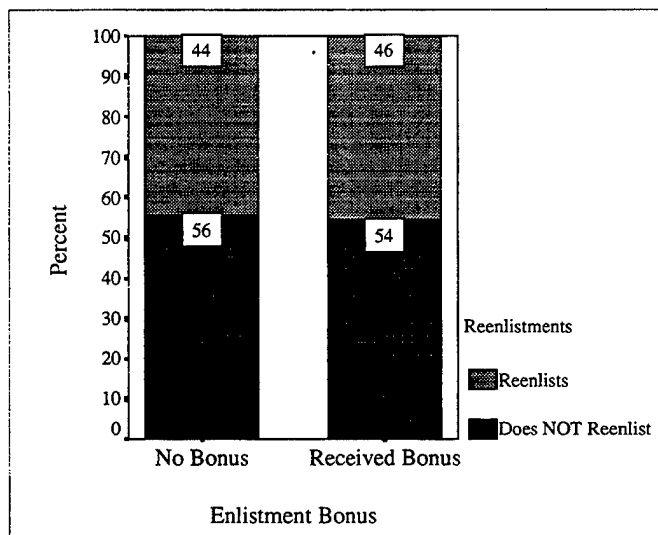
Figure 39. 1991 Cohort Reenlistment Rate by Enlistment Bonus
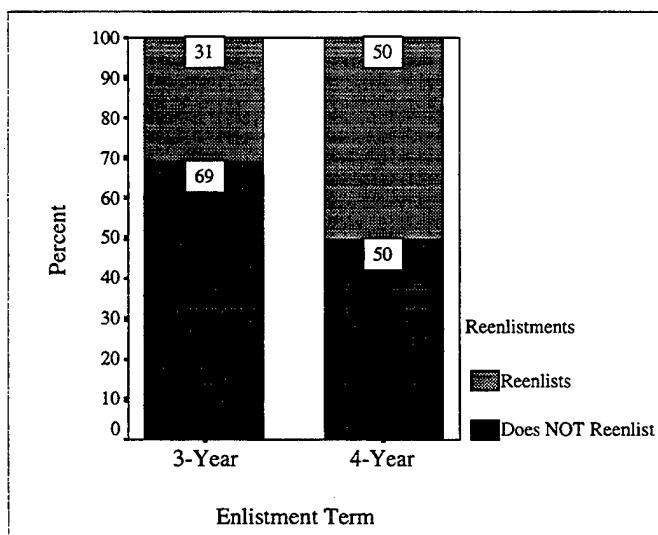
Figure 40. 1991 Cohort Reenlistment Rate by Enlistment Term

Figure 41 indicates soldiers who had some college education reenlisted at a lower

rate when compared with those soldiers who possessed a high school diploma.
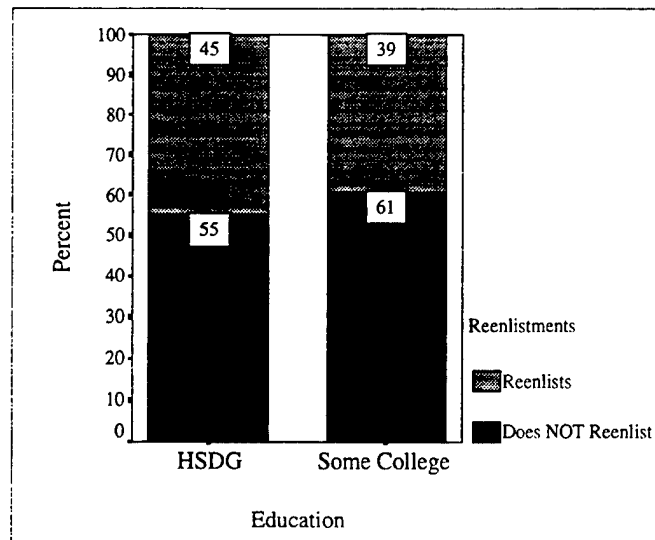
Figure 41. 1991 Cohort Reenlistment Rate by Education

Figure 42 is further evidence that suggests the Army College Fund may provide an

incentive for soldiers to leave the Army after the first-term.
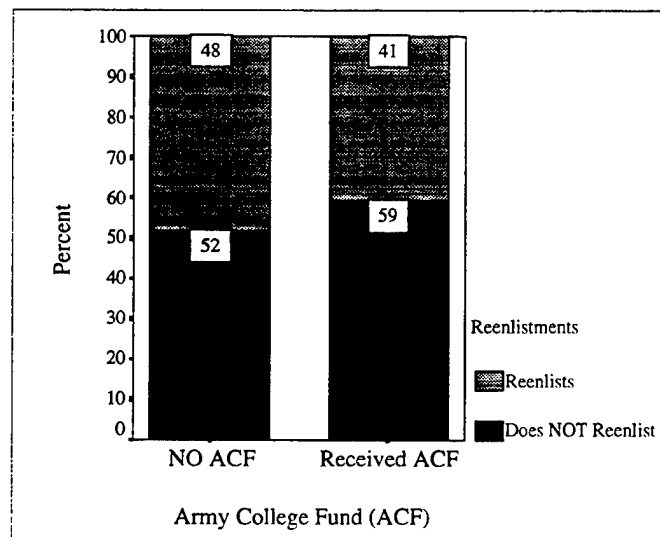
Figure 42. 1991 Cohort Reenlistment Rate by Army College Fund

D.   1992 COHORT

1.   Frequency

Figure 43 illustrates the racial make-up of the 1992 cohort. Whites account for 80.4 percent of soldiers, and blacks and other minorities comprise 13.6 percent and 6.1 percent, respectively.
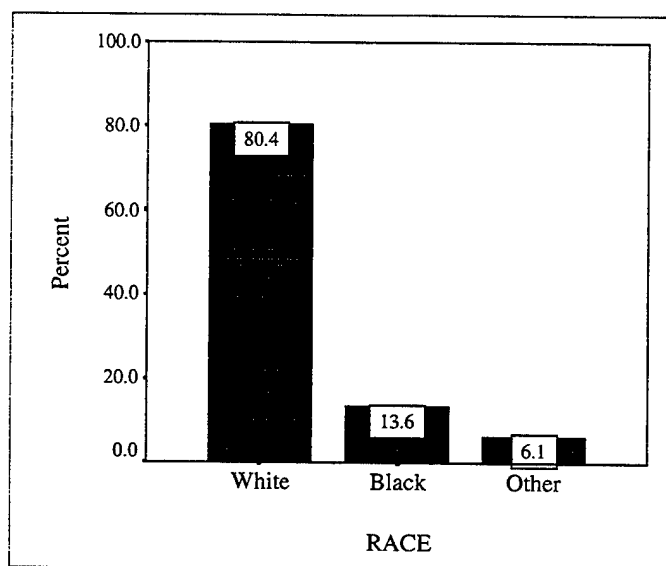
Figure 43. 1992 Cohort Frequency by Race

Figure 44 indicates that 71.2 percent of soldiers achieved the pay grade of E-4 at the completion of their first term of enlistment. Another 8.4 percent were promoted to E-5, while only a very few (0.1 percent) achieved E-6.
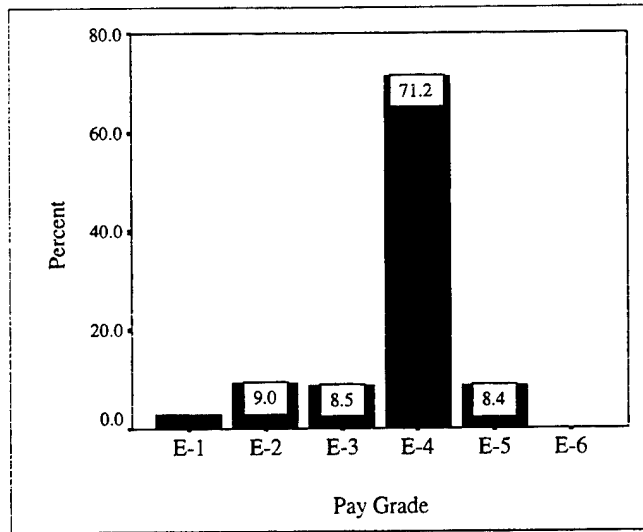
Figure 44. 1992 Cohort Frequency by Pay Grade

Figure 45 shows the family status of the 1992 cohort. As seen below, 61.1 percent of soldiers remained single and had no children during their first term of enlistment. Slightly less than one-third of soldiers were married with children at the first-term reenlistment point.
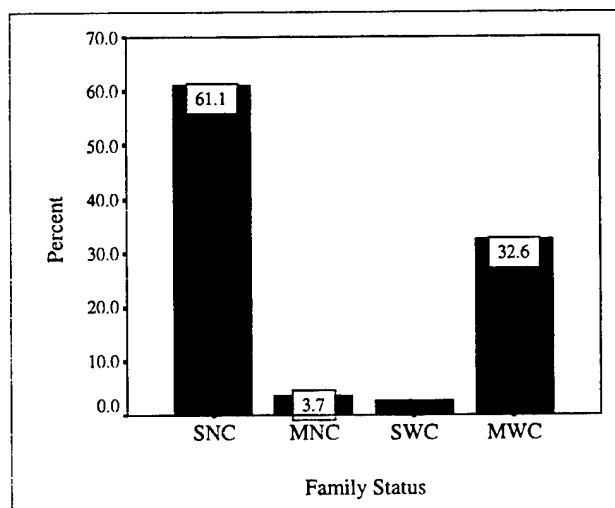
Figure 45. 1992 Cohort Frequency by Family Status

Figure 46 shows the AFQT categories of enlistees (C-Group 1 personnel) in the 1992 cohort. The majority (51.1 percent) were in Category II and only 7.4 percent were in Category I.
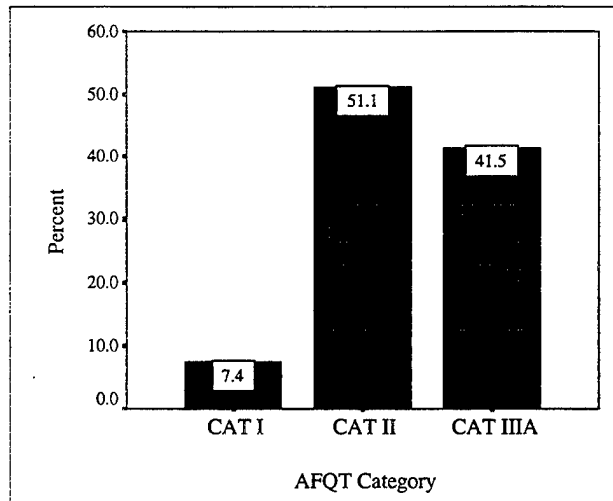
Figure 46. 1992 Cohort Frequency by AFQT Category

Figure 47 indicates the majority of soldiers enlisted for a four-year term, while Figure 48 shows the majority of soldiers did not receive a bonus on enlistment.
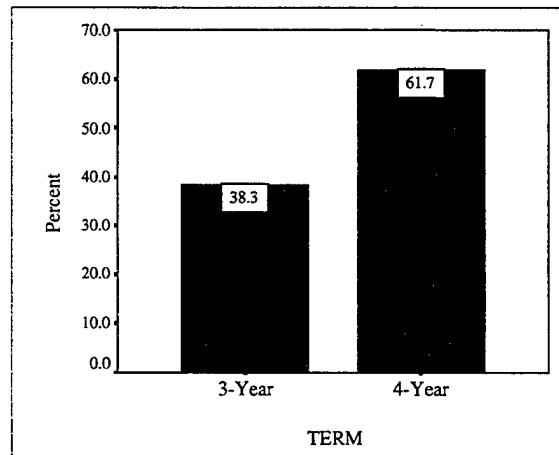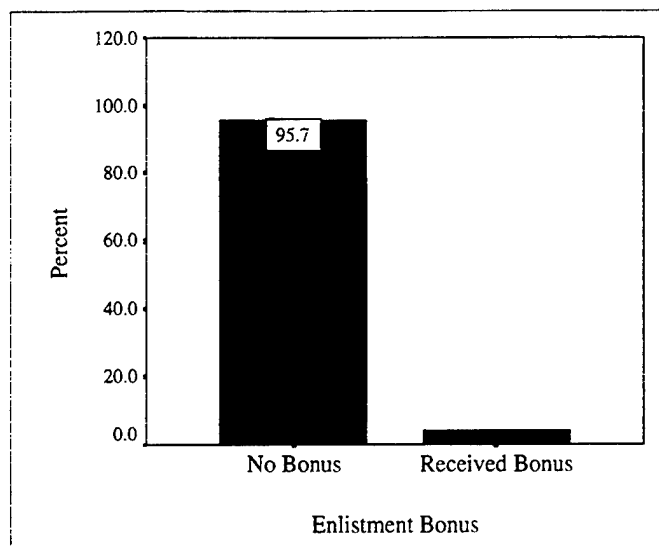

Figure 47. 1992 Cohort Frequency by Enlistment Term

Figure 48. 1992 Cohort Frequency by Enlistment Bonus

Figure 49 indicates 87.6 percent of C-Group 1 soldiers who enlisted in FY 1992 possessed a high school diploma and another 12.4 percent had some college education.
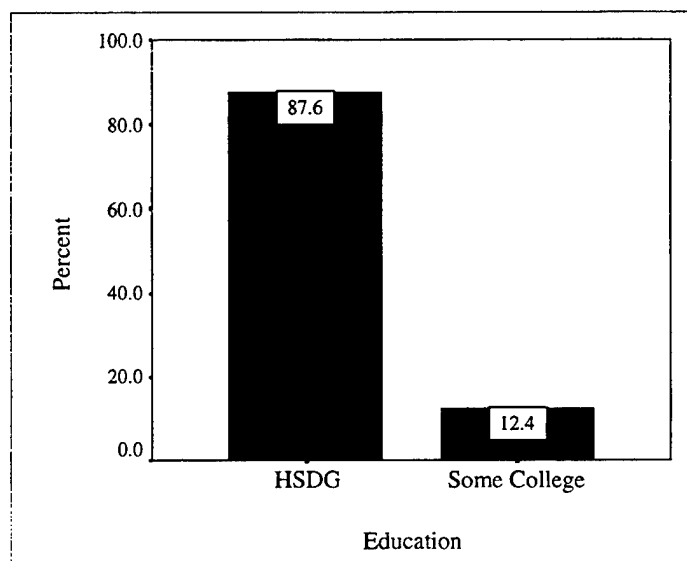

Figure 49. 1992 Cohort Frequency by Education

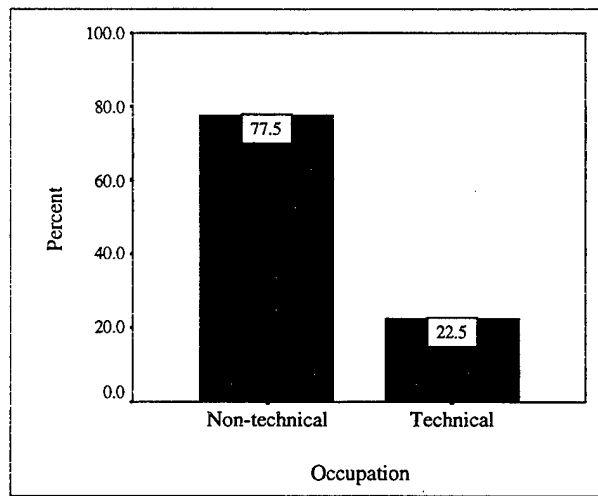Figure 50 indicates the majority of soldiers were employed in non-technical occupations, as defined earlier.

Figure 50. 1992 Cohort Frequency by Occupation

Figure 51 indicates the majority of soldiers enlisted at 19 years of age, while two-thirds of soldiers that enlisted were between 18 and 20 years of age inclusive. The mean age at enlistment was 20.35 years, and the median age was precisely 20 years old.
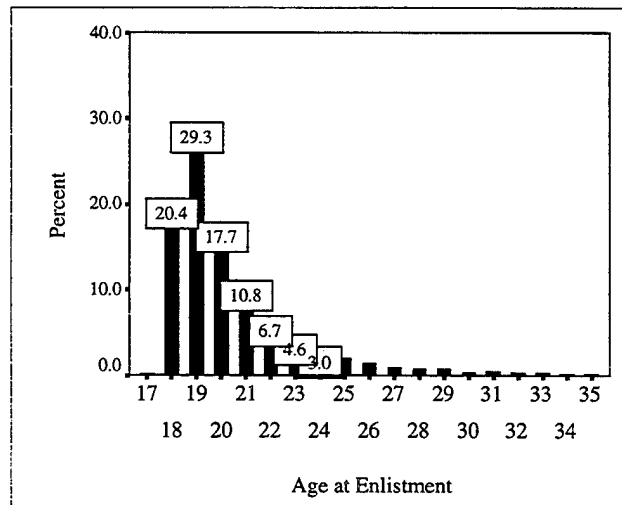

Figure 51. 1992 Cohort Frequency by Entry Age

Figure 52 shows that 47.9 percent of soldiers who were eligible for reenlistment had received the ACF.
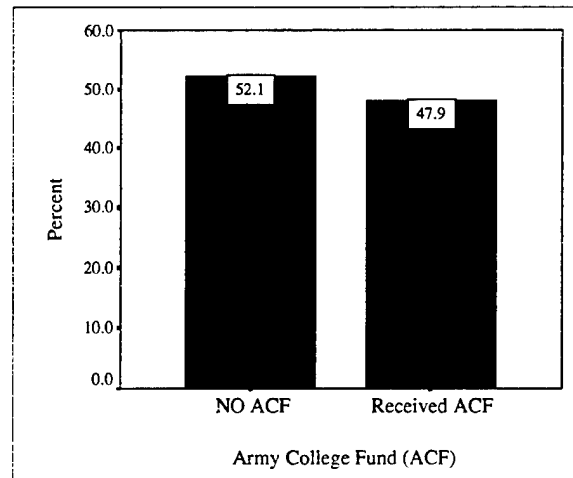

Figure 52. 1992 Cohort Frequency by Army College Fund

Finally, Figure 53 indicates that 45.4 percent of high-quality, C-Group-1, soldiers who made it through their first term of enlistment went on to reenlist.
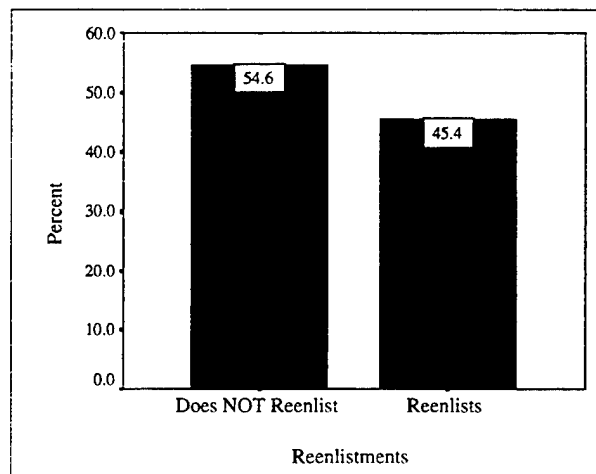

Figure 53. 1992 Cohort Frequency by Reenlistment

2. Cross Tabulation

Figure 54 illustrates the 1992 cohort reenlistment rate by race. Once again, black soldiers tended to reenlist at a greater rate than did their white counterparts. The majority of black soldiers (61 percent) reenlisted, while the majority, (57 percent), of white soldiers did not reenlist.
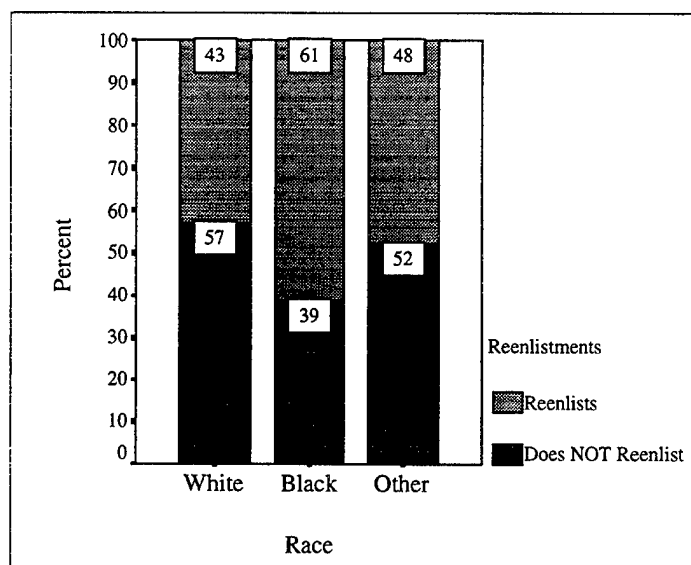

Figure 54. 1992 Cohort Reenlistment Rate by Race

Figure 55 illustrates the 1992 cohort reenlistment rate by pay grade. The vast majority of soldiers that did not get promoted beyond E-3, and were eligible to reenlist, did not reenlist. The higher a soldier's pay grade, the greater was his reenlistment rate. Even though the percentage of soldiers promoted to E-6 was extremely small (0.3 percent), all except for one soldier reenlisted.
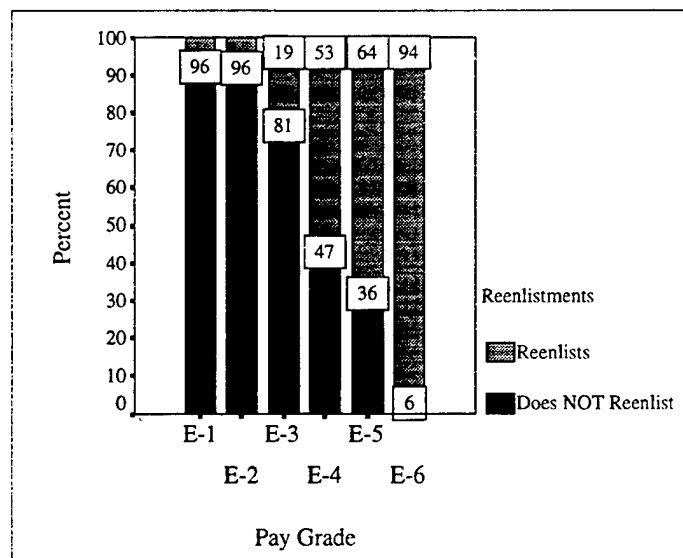
97

Figure 55. 1992 Cohort Reenlistment Rate by Pay Grade

Figure 56 presents the rate of reenlistment by AFQT Category. As a soldier's

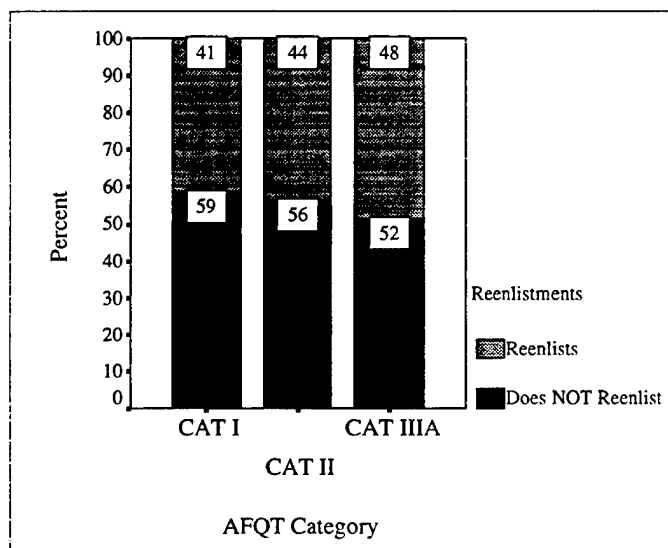AFQT category decreased, his reenlistment rate increased.

Figure 56. 1992 Cohort Reenlistment Rate by AFQT Category

Figure 57 illustrates the rate of reenlistment by family status. Married soldiers displayed a higher rate of reenlistment when compared with their single counterparts. In general, soldiers with dependents reenlisted at a higher rate than did single soldiers in the FY 1992 cohort.
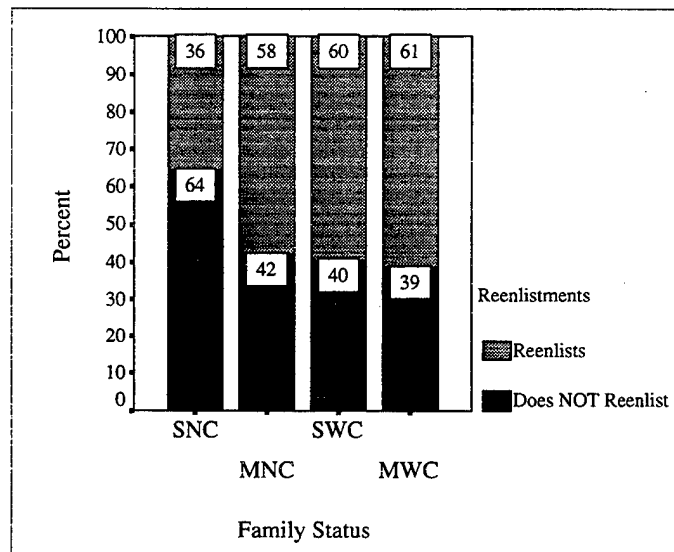

Figure 57. 1992 Cohort Reenlistment Rate by Family Status

Figure 58 illustrates the rate of reenlistment by occupation. Soldiers deemed to be employed in a technical occupation reenlisted at a slightly higher rate compared with those in a non-technical occupation. Remember the majority of soldiers were employed in non-technical occupations. Refer to Chapter V for further detail regarding the categorization of technical and non-technical occupations.
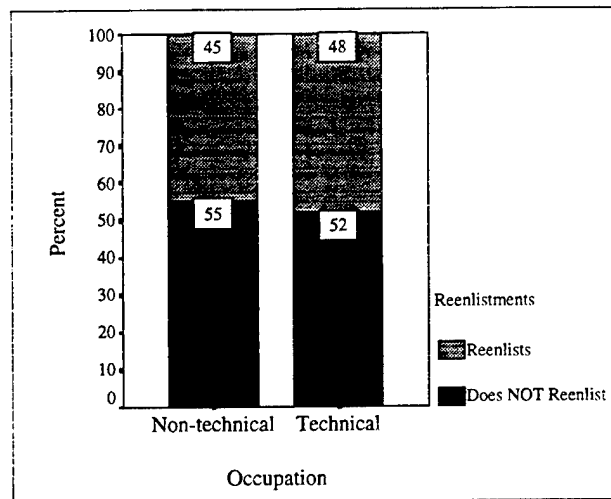
Figure 58. 1992 Cohort Reenlistment Rate by Occupation

Figure 59 depicts reenlistment rates by entry age. Only enlistments between the ages of 18 and 23, inclusive, are displayed (this accounts for 91.7 percent of the 1992 cohort). Generally, the observed trend is that teenagers at time of enlistment, reenlisted at a lower rate while soldiers 20 and over at time of enlistment reenlisted at a slightly higher rate. Basically the older a soldier, the higher was the reenlistment rate.
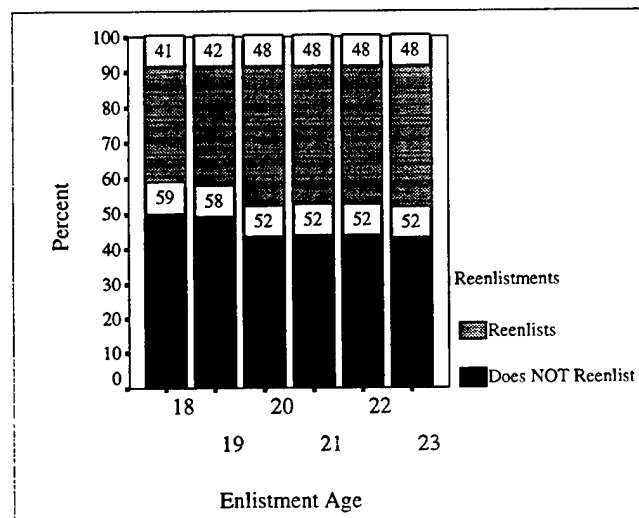
Figure 59. 1992 Cohort Reenlistment Rate by Entry Age

100

Figure 60 shows that soldiers who received an enlistment bonus tended to reenlist at a slightly greater rate than did those without a bonus, while Figure 61 shows virtually no difference in reenlistment rates between 3-year and 4-year term enlistees in the FY 1992 cohort.
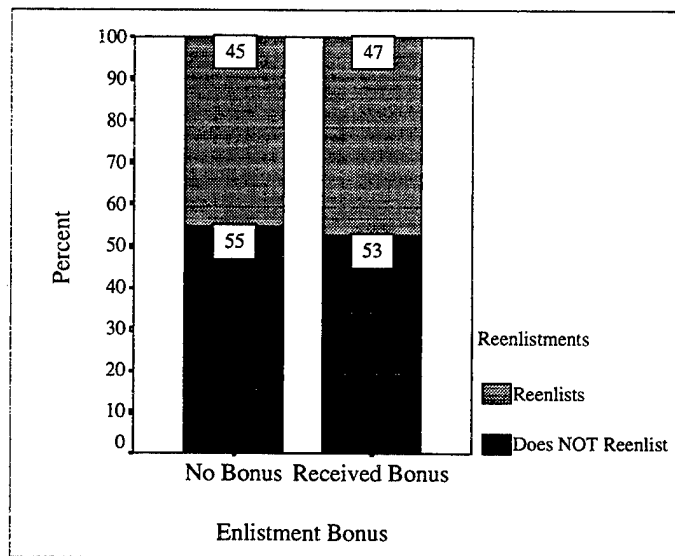
Figure 60. 1992 Cohort Reenlistment Rate by Enlistment Bonus
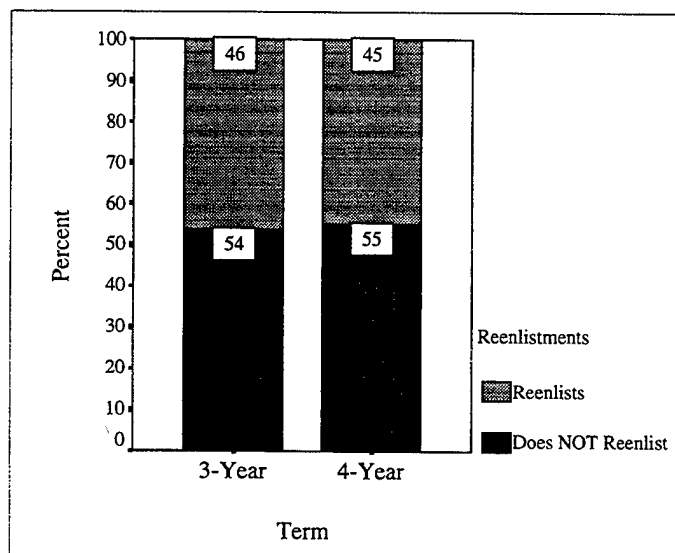
Figure 61. 1992 Cohort Reenlistment Rate by Enlistment Term

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Figure 62 indicates C-Group 1 soldiers who had some college education

reenlisted at a slightly lower rate when compared with soldiers who possessed a high

school diploma.
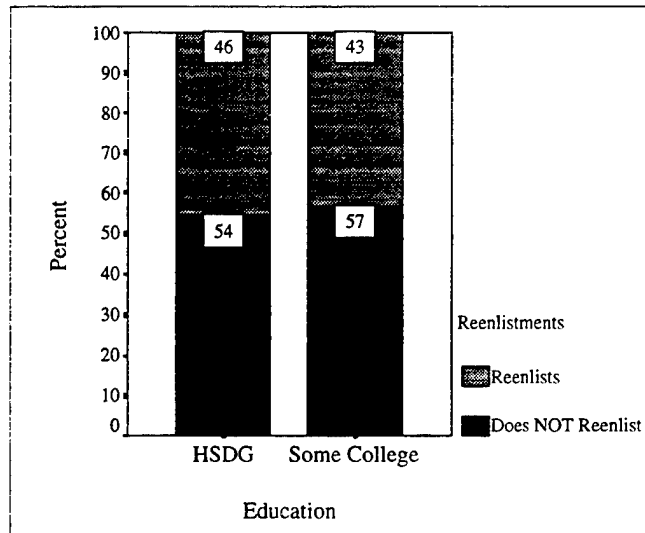
Figure 62. 1992 Cohort Reenlistment Rate by Education

Figure 63 suggests the Army College Fund may provide an incentive for soldiers

to leave the Army after the first term.
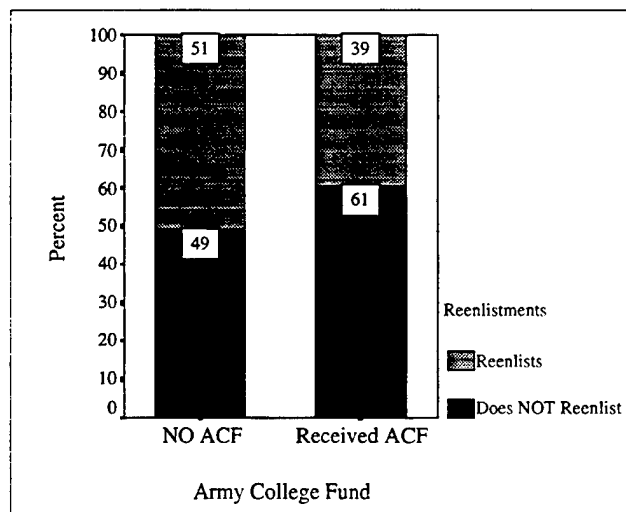
Figure 63. 1992 Cohort Reenlistment Rate by Army College Fund

APPENDIX B: SPSS OUTPUT FOR LOGISTIC MODEL

Table 7. Parameter Estimates of Model (FY 1990 – FY 1992)

```
---------------------- Variables in the Equation ----------------------


Variable             B        S.E.     Wald    df     Sig        R    Exp(B)


RACE                                 284.9278   2    .0000    .0717
 BLACK             .5483     .0325 284.1571    1    .0000    .0719   1.7303
 OTHER MINORITY    .0477     .0482    .9794    1    .3224    .0000   1.0489
PAY GRADE                            2944.134   5    .0000    .2317
 E-1             -3.8804     .1805 462.2052    1    .0000   -.0918    .0206
 E-2             -3.4413     .0983 1224.761    1    .0000   -.1496    .0320
 E-3             -1.9019     .0541 1235.451    1    .0000   -.1502    .1493
 E-5              2.0758     .4416  22.0936    1    .0000    .0192   7.9706
 E-6               .4865     .0357 185.7187    1    .0000    .0580   1.6266
AFQTCAT                               47.7784   2    .0000    .0283
 CAT I            -.3085     .0471  42.9134    1    .0000   -.0274    .7345
 CAT II           -.1013     .0238  18.0781    1    .0000   -.0172    .9036
FAMSTAT                              699.9517   3    .0000    .1127
 MNC               .5090     .0326 244.0263    1    .0000    .0666   1.6636
 SWC               .5034     .0728  47.8116    1    .0000    .0290   1.6543
 MWC               .7033     .0293 577.5762    1    .0000    .1026   2.0204
ENL BONUS         -.0846     .0398   4.5083    1    .0337   -.0068    .9189
ENL TERM (3-YR)    .4715     .0275 294.9371    1    .0000    .0732   1.6025
AGE               -.0095     .0048   3.9761    1    .0461   -.0060    .9905
COLLEGE           -.3952     .0420  88.6993    1    .0000   -.0398    .6736
TECH-OCCUPATION   -.0291     .0258   1.2787    1    .2581    .0000    .9713
ACF               -.0538     .0245   4.8019    1    .0284   -.0072    .9477
FY COHORT                             35.6532   2    .0000    .0241
 FY 1991           .0829     .0279   8.8171    1    .0030    .0112   1.0864
 FY 1992           .1672     .0280  35.6438    1    .0000    .0248   1.1820
Constant          -.1696     .0967   3.0743    1    .0795
```

Source: SPSS Output derived from merging the STF database and DMDC cohort files, author.

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